Exabyte 690D Library

Installation and Operation

Exabyte®

329619-002

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Revision History

Revision	Date	Description
000	August 1998	Beta release
001	September 1998	Initial release
002	August 1999	Added information about NetStorm™ Library Monitor software, Ethernet, Autoclean, Slot Setup, Fibre Channel, and Quantum® DLT™ 8000 tape drives

Note: The most current information about the library is available from Exabyte's World Wide Web site (www.exabyte.com).

FCC Notice

This equipment has been tested and found to comply with the limits for a digital device, pursuant to 47 CFR, Part 15, Subpart B, Class A of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential, commercial, or light-industrial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Shielded cables are required for this device to comply with FCC Rules. **Use shielded cables when connecting this device to others**.

According to FCC regulations, changes or modifications to this equipment that are not expressly approved by Exabyte could void the user's authority to operate the equipment.

Industry Canadian Notice ICES-003 digital apparatus

Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

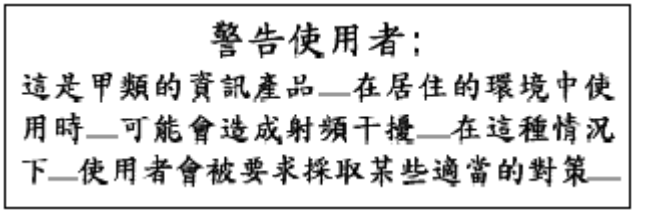
English This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Laser Safety Notice

This library complies with 21 CFR 1010.10 and 1040.11, Class I for laser products and IEC 825-1, Safety of Laser Products, Part 1: Equipment Classification, Requirements and User's Guide.

Bureau of Standards, Metrology, and Inspection (BSMI) - Taiwan

This equipment has been tested and complies with CNS C6357.



English Warning! This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.

Australia/New Zealand

This equipment has been tested and complies with AS/NZS 3548.

European Union

This equipment complies with the following standards:

- EN 55022/CISPR22 Class A
- EN 50082-2
- EN 61000-3-2
- EN 61000-3-3

Product Warranty Caution

The Exabyte® 690D Library is warranted to be free from defects in materials, parts, and workmanship and will conform to the current product specification upon delivery. For the specific details of your warranty, refer to your sales contract or contact the company from which the library was purchased.

The warranty for the library shall not apply to failures of any unit when:

- The library is repaired by anyone other than the Manufacturer's personnel or approved agent.
- The library is physically abused or is used in a manner that is inconsistent with the operating instructions or product specification defined by the Manufacturer.
- The library fails because of accident, misuse, abuse, neglect, mishandling, misapplication, alteration, faulty installation, modification, or service by anyone other than the factory service center or its approved agent.
- The library is repaired by anyone, including an approved agent, in a manner that is contrary to the maintenance or installation instructions supplied by the Manufacturer.
- The Manufacturer's serial number tag is removed.
- The library is damaged because of improper packaging on return.

CAUTION

Returning the library in unauthorized packaging may damage the unit and void the warranty.

If problems with the library occur, contact your maintenance organization; do not void the product warranty by allowing untrained or unauthorized personnel to attempt repairs.

Notes

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About this manual

Use this manual to install, configure, operate, maintain, and diagnose problems with the Exabyte® 690D Library.

This manual includes the following chapters:

- Chapter 1 provides an overview of the 690D library.
- Chapter 2 describes how to install and set up the library.
- Chapter 3 describes basic configuration settings.
- Chapter 4 describes optional configuration settings.
- Chapter 5 describes how to operate the library.
- Chapter 6 describes how to operate the tape drives.
- Chapter 7 describes routine maintenance procedures.
- Chapter 8 describes library upgrade procedures.
- Chapter 9 describes how to perform hardware exercises.
- Chapter 10 describes how to monitor library status.
- Chapter 11 describes how to access library firmware.
- Chapter 12 describes basic troubleshooting procedures.
- Appendix A provides library performance specifications.
- Appendix B provides SCSI configuration information.
- Appendix C provides information on Fibre Channel.
- Appendix D describes LCD error codes.
- Appendix E provides basic laser safety information.
- Appendix F provides shipping instructions.

Conventions used in this manual

Save Boxed text indicates context-sensitive softkeys on the operator panel's keypad that correspond to key positions on the LCD screen.

Note: Notes provide hints or suggestions about the topic.

➤ **Important** Information next to the word "Important" helps you complete a procedure or avoid extra steps.

CAUTION

Boxed text under the heading "CAUTION" provides information you must know to avoid damaging the library or tape drives or losing data.

WARNING!

Boxed text under the heading "WARNING!" provides information you must know to avoid personal injury.

Related publications

For information about the Exabyte 690D and the standards used by the Exabyte 690D, refer to the following publications.

Note: Exabyte technical publications are available on the Support Services section of the Exabyte web site (www.exabyte.com).

Exabyte 690D Library

- *Exabyte 690D Library Product Specification*, 329620
- *Exabyte 690D Library SCSI Reference*, 329621
- *Exabyte FC11 and FC12 Fibre Channel to SCSI Router Installation and Operation*, 328311
- *Exabyte Bar Code Label Specification for DLT Cartridges*, 321195

Quantum® DLT™ Tape Drives

- *DLT 7000 Tape Drive Product Manual* (available from Quantum Corporation)
- *DLT 8000 Tape Drive Product Manual* (available from Quantum Corporation)

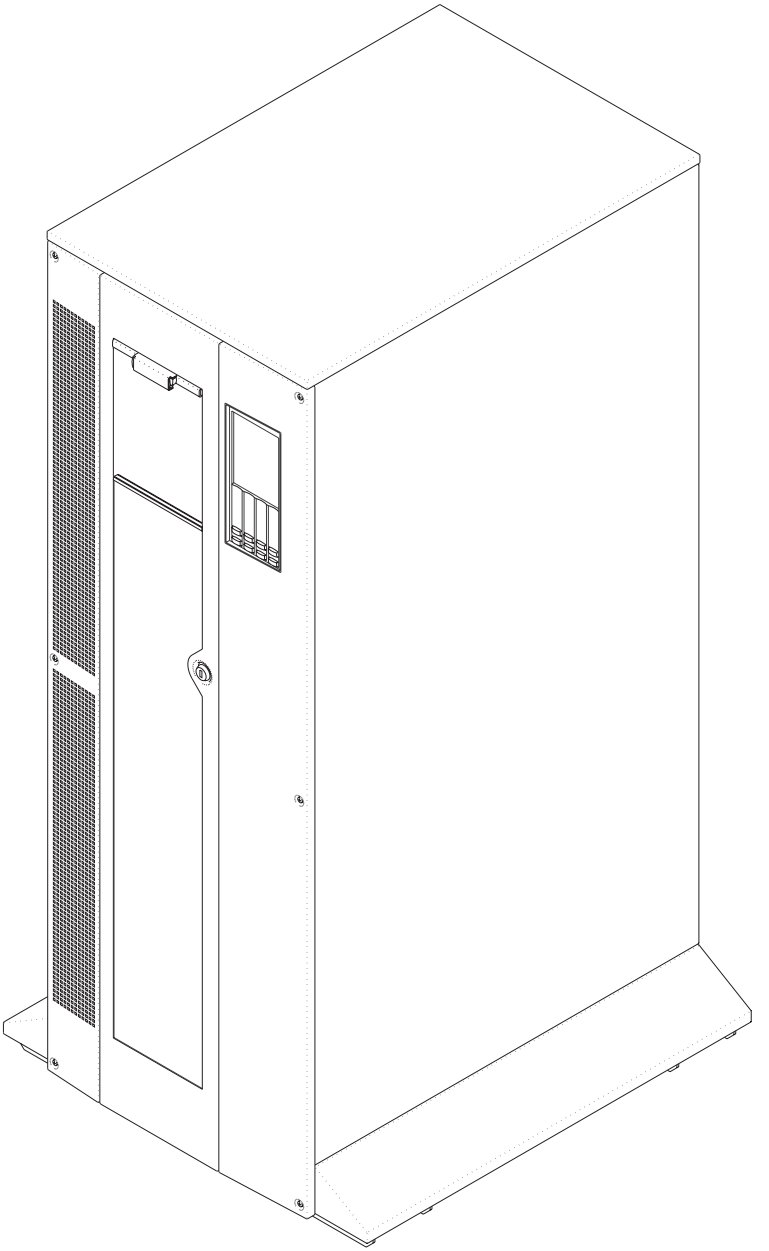
Standards

- ANSI *Small Computer System Interface (SCSI),* X3.131, 1989
- ANSI *Small Computer System Interface-2 (SCSI-2),* X3.131, 1994
- IEEE 802.3 *Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications,* 1985
- EIA *Rack Standards,* RS-310-B

1 Product Overview

Congratulations on selecting the Exabyte® 690D Library. Your new library provides unattended data storage, archiving, backup, and retrieval for mid-range and high-end workstations, servers, and networks.

This chapter provides an overview of the Exabyte 690D and a description of the library components. The Exabyte 690D is available as a standalone model, as shown in the figure on the following page. You can convert the library to a rack-mount model with hardware available commercially or from Exabyte.



About the Exabyte 690D

The library contains the following components:

- Cartridge handler (referred to as the robot)
- Two to six Quantum® DLT™7000 or DLT 8000 tape drives
- 6, 12, or 18 data cartridge magazines (each magazine contains five cartridges for a total of 30, 60, or 90 cartridges)
- One or two power supplies
- Fixed cartridge slot to store a cleaning cartridge or an additional data cartridge
- Calibration block slot to store the calibration block
- Laser bar code scanner to maintain a customized cartridge inventory and to calibrate the library
- Entry/exit port (containing a removable magazine with five cartridge slots) to access data cartridges without opening the library door
- Ethernet interface for access to NetStorM™Library Monitor, a Java browser-based management tool
- FC12 Fibre Channel to SCSI router (optional)

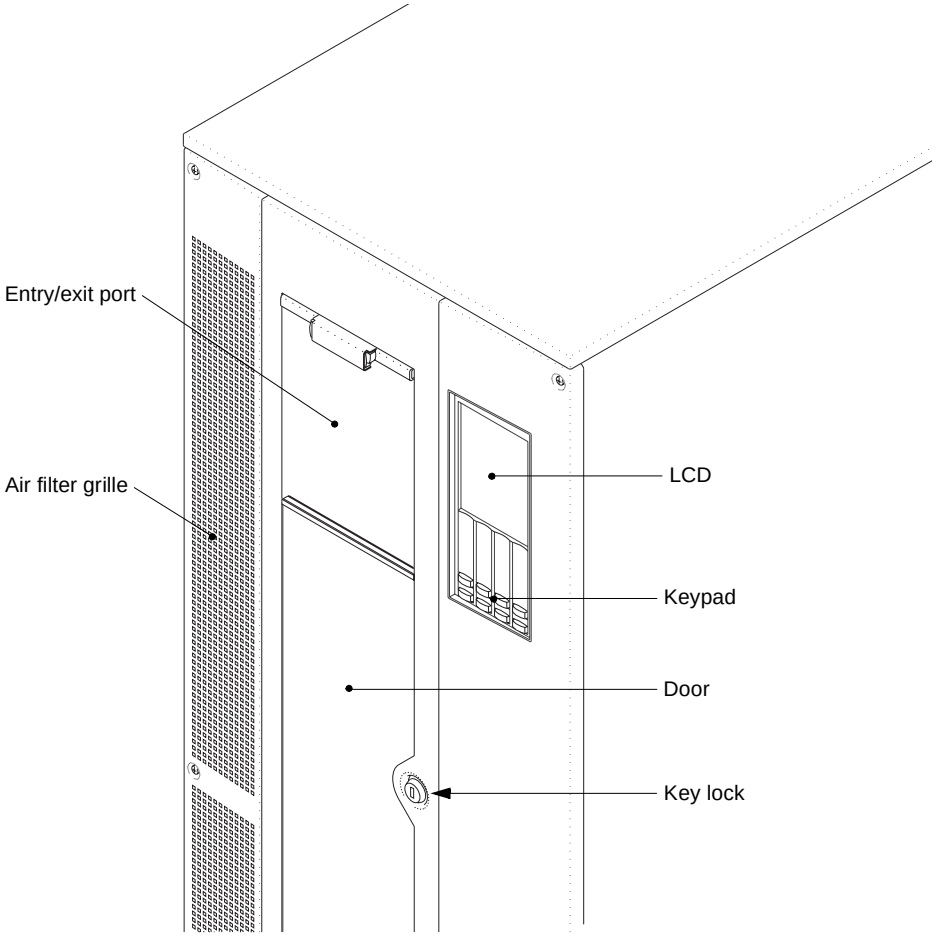
The library and tape drives are available in a wide, low-differential (LVD) or wide, high-differential (HVD) SCSI configuration. The library and tape drives operate as independent SCSI devices on up to seven SCSI buses.

When the library is operating with six DLT™7000 tape drives and using 90 data cartridges (assuming an average data compression ratio of 2:1), the Exabyte 690D stores up to 6.3 terabytes (TB) of data. When operating with six DLT 8000 tape drives and using 90 data cartridges, the library stores up to 7.2 TB of data.

Library components

The following sections describe the library's front panel, internal, and back panel components.

Front panel components



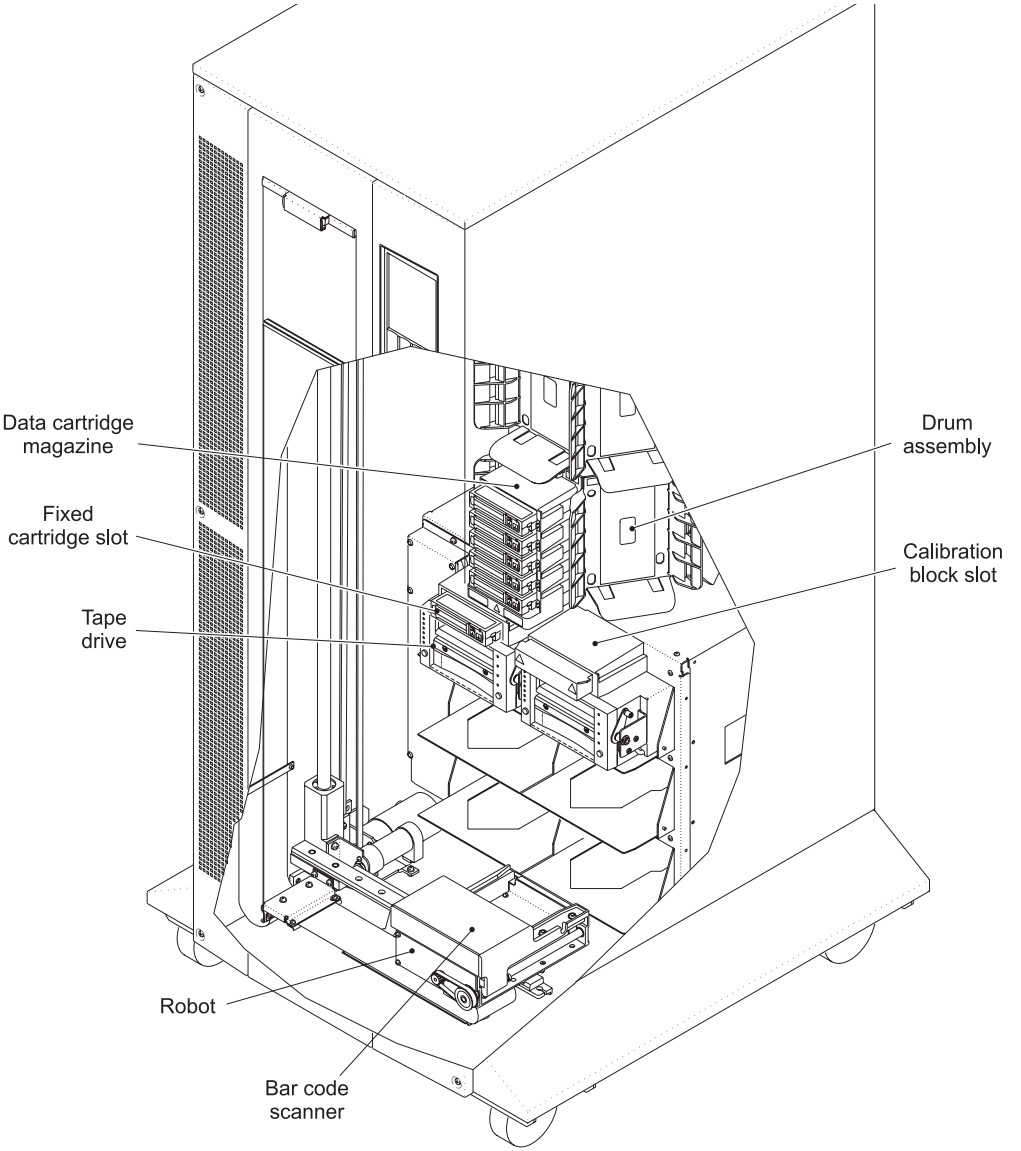
- **Entry/exit port.** The entry/exit port contains one removable data cartridge magazine that can hold five data cartridges. Using the entry/exit port, you can insert or remove up to five individual data cartridges without opening the library door.

- **LCD and keypad (operator panel).** The LCD (liquid crystal display) contains a 240 × 320 pixel display that allows you to view the operational status of the library. The keypad contains context-sensitive keys, called *softkeys*, that are programmed so that you can select a range of functions within each level of the menu structure.

- **Door and key lock.** The front door features a key lock that enables you to lock the door for data security.

- **Air filter grille.** The air filter grille allows air to circulate through the library to reduce the operating temperature of the library and tape drives. A fan inside the library pulls air through the air filter grille, and a replaceable air filter located behind this grille prevents dust and other airborne contaminants from entering the library's enclosure.

Internal components



- **Drum assembly.** The drum assembly holds the data cartridge magazines and rotates to position the magazines in front of the robot.

- **Calibration block slot.** The calibration block slot, located to the right of the fixed cartridge slot, provides a storage location for the calibration block. The calibration block slot is not addressable and cannot be accessed by the robot except during calibration.

➤ **Important** Do not remove the calibration block from the calibration block slot. If you place the calibration block in a different slot, library operation may be interrupted or terminated.

- **Robot**. The robot moves cartridges between the storage locations and the tape drives. The robot contains a laser **bar code scanner** that reads bar code labels affixed to the cartridges. See Appendix E for laser safety information.

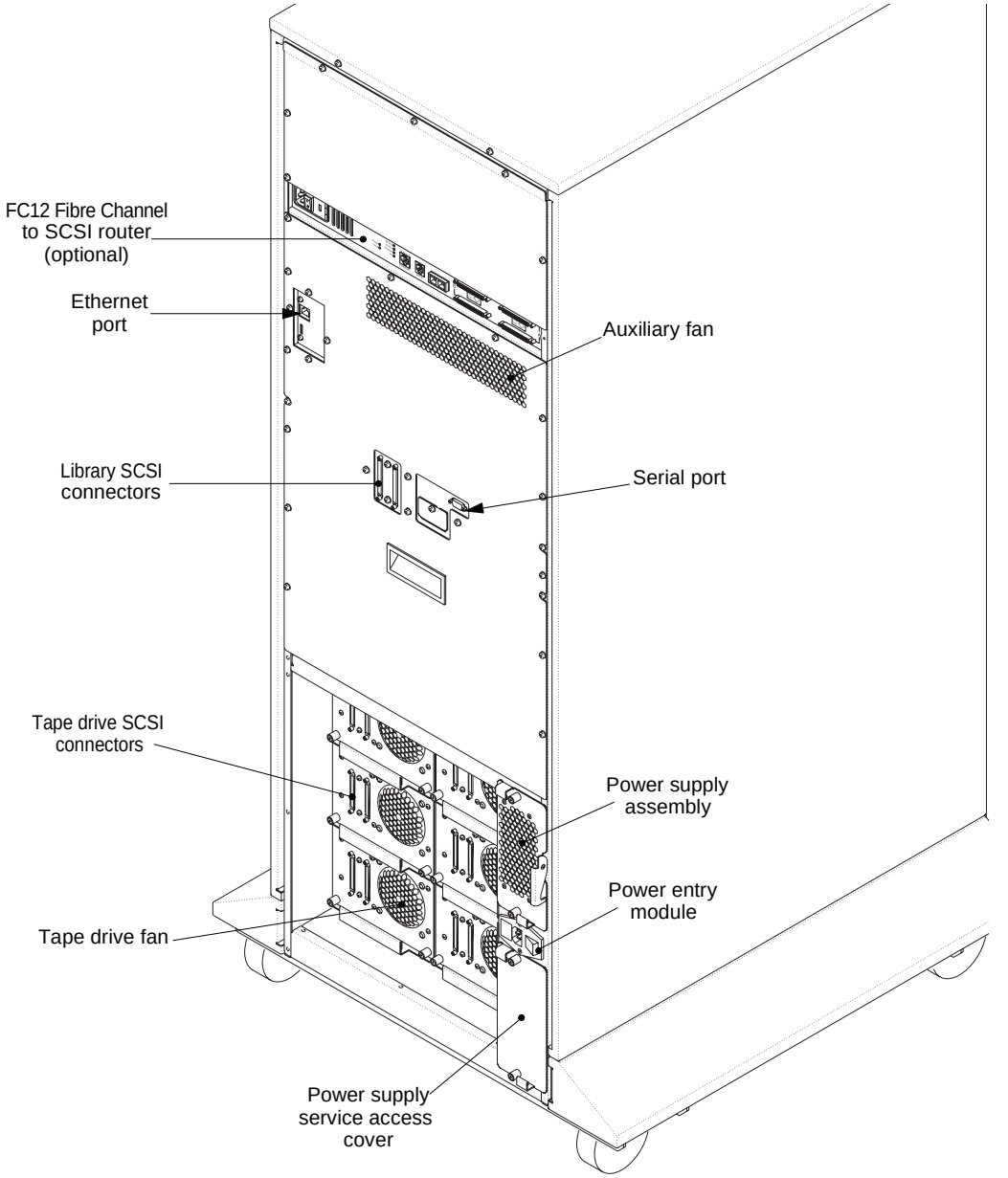
- **Tape drives.** The library includes up to six Quantum® DLT™ 7000 or DLT 8000 tape drives, which are housed in removable Exabyte drive carriers.

- **Fixed cartridge slot.** The fixed cartridge slot, located directly above the tape drives on the left, provides a storage location for a single cartridge. This slot is typically used to store a DLT cleaning cartridge.

- **Data cartridge magazines.** The data cartridge magazines are the removable carriers for the DLT data cartridges. Each magazine stores up to five DLT cartridges. The bottom of each magazine contains a white triangle, called a *calibration target*, that is used by the robot's laser scanner to accurately detect the location of the magazine. The library contains a total of 6, 12, or 18 data cartridge magazines. The magazines snap onto mounting plates on the library's rotating drum assembly, allowing easy removal and replacement of cartridges.

- **Power distribution fan (not shown).** The power distribution fan, located toward the back on the left side of the library, lowers the operating temperature of the primary power supply and the redundant power supply.

Back panel components



- **Auxiliary fan.** This fan reduces the operating temperature of the library's controller card.

- **Serial port.** The serial port allows you to connect a serial cable from the library to a remote terminal so that you can perform diagnostics using emulation software.

- **Power supply assembly.** The power supply assembly houses the power supply for the library. The library is equipped with a primary power supply, located above the power entry module. A redundant power supply, located below the power entry module, is optional.

- **Power entry module.** The power entry module includes the power connector, the power switch, and the fuse drawer.

- **Power supply service access cover.** The library contains housing for a second power supply, located directly beneath the power switch. This power supply is optional and can be ordered from Exabyte.

- **Drive carrier service access cover (not shown).** The library can hold up to six DLT 7000 or 8000 tape drives. If your library contains fewer than six tape drives, the unused drive slots are protected by drive carrier service access covers.

- **Tape drive fan.** Each tape drive carrier contains a fan. The fan reduces the tape drive's operating temperature.

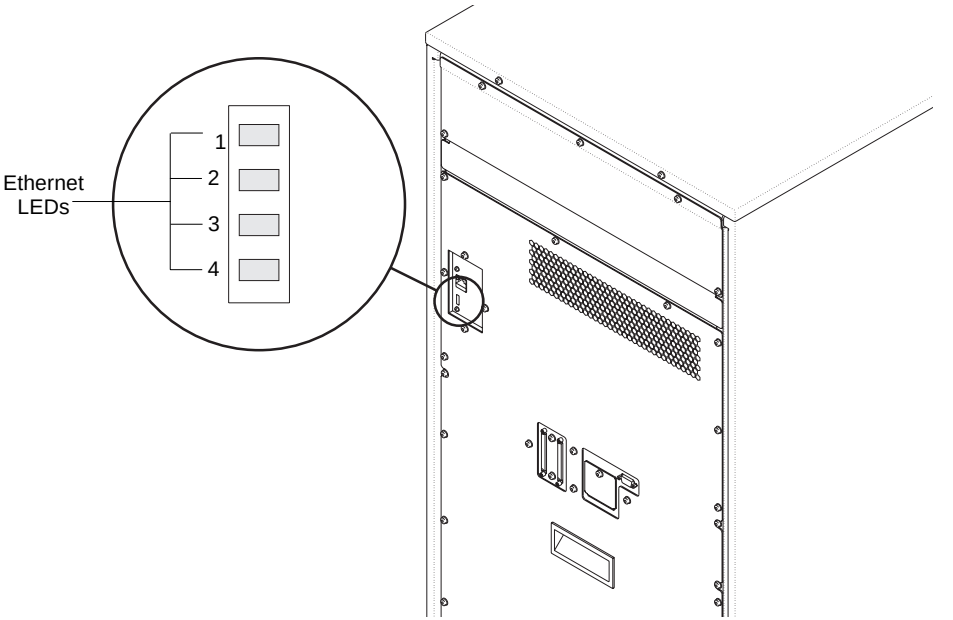
- **Tape drive SCSI connectors.** Each tape drive installed in the library contains two wide, LVD or HVD SCSI connectors.

- **Library SCSI connectors.** The Exabyte 690D contains two wide, LVD or HVD SCSI connectors for the library.

- **FC12 Fibre Channel to SCSI router (optional).** The Exabyte FC12 Fibre Channel to SCSI router can be installed as an optional feature inside the 690D library. The router allows you to integrate the library into any Fibre Channel environment, such as a Storage Area Network (SAN). SAN integration allows multiple servers to access the library with increased speed and manageability.

- **Ethernet port.** The Ethernet port allows you to connect a 10/100Base-T cable from the library to a network server. With an Ethernet connection and the library's NetStorM™Monitor interface, you can monitor library operations from any remote location.

  After you connect the Ethernet cable to a network and power on the library, you can check the Ethernet light-emitting diodes (LEDs) for information about the status of the Ethernet connection, as described in the table on the following page.



LED	Color	Name	Description	Typical status
1	Yellow	Full Duplex	Auto-negotiate mode is disabled and Ethernet is operating in Full Duplex mode.	Off
2	Green	Speed	A device is detected on the network (such as an Ethernet card) that allows 100Base-T transmission speed.	On
3	Green	Link Status	A link to the network has been established.	On
4	Yellow	Activity	Data transmission/reception is taking place.	Blinking

NetStorM™ Library Monitor software

Using the Ethernet port and a 10/100Base-T connection, you can access NetStorM Library Monitor software via a web browser. The NetStorM Library Monitor allows up to 10 remote client users to simultaneously access library information without interrupting library operation.

Installing NetStorM Monitor software

To install NetStorM Library Monitor software, you must first set up the Ethernet connection from the library (see page 74) and connect the Ethernet cable (see page 78). You can then install the NetStorM Library Monitor software from the CD that was shipped with the library. The CD also contains a readme file with software installation instructions.

For information about software upgrades, check Exabyte's web site (www.exabyte.com).

Accessing the community strings

The NetStorM Library Monitor uses Simple Network Management Protocol (SNMP), which employs community strings as a way to restrict access to certain areas by requiring users to know what the strings are.

The NetStorM monitor uses three community strings: Read, Write, and Broadcast. Default values for these community strings are set at the factory and can be easily viewed on the library's Ethernet Setup screen with security disabled.

The community string values can be viewed and changed from three different interface levels: the library's LCD, NetStorM Monitor, and the library's serial port. Each of these interface levels allows *read only*, *write only*, or *read-write* status for a given community string. For example, all three community strings are *read only* (they can be viewed but not changed) from the library's LCD. However, all three community strings are *read-write* (they can be viewed as well as changed) from the serial port interface.

The following table describes the *read only*, *write only*, and *read-write* status of the community strings for each interface.

<table>
<tr><th>Community string</th><th>NetStorM Monitor interface</th><th>Library LCD interface</th><th>Serial console interface</th></tr>
<tr><td>Read</td><td>read only (cannot write)</td><td rowspan="3">read only (cannot write)</td><td rowspan="3">read-write</td></tr>
<tr><td>Write</td><td rowspan="2">write only (cannot read)</td></tr>
<tr><td>Broadcast</td></tr>
</table>

2 Installation and Setup

This chapter describes how to install and set up the library hardware.

Preparing for installation

This section provides step-by-step instructions for preparing the library. You can use the table below as a checklist.

✔	Step	Description
	1	Unpack the library.
	2	Check the accessories and equipment.
	3	Obtain additional equipment.
	4	Prepare the host computer.
	5	Prepare the library for installation.

Step 1 – Unpack the library

Complete the unpacking steps printed on the box. Save all the original packing materials in case you need to ship or move the library later.

Step 2 – Check the accessories

Make certain you received the accessories included with the library. You can use the table below as a checklist.

Required accessories and equipment	
Power cord (U.S. and Canada only)	Included with the library. (For power cord specifications for other voltages and international use, see page 241.)
Two keys for the front door	Included with the library.
Exatape DLT Data Cartridge Magazines	Installed in the library (one data cartridge magazine for the entry/exit port and 6,12, or 18 magazines for the data cartridge slots). One magazine cover is included with the library.
Magazine labels and cartridge slot labels	Included with the library.
Cleaning packets for the door	Included with the library.
NetStorM™Library Monitor software CD	Included with the library.
Optional accessories and equipment	
SCSI terminators for the router	Included with the library, if the library was installed with an FC12 Fibre Channel to SCSI router.
Power cord for the router	
Serial cable for the router	

Step 3 – Obtain additional equipment

The following table lists the additional equipment you may need to obtain.

Equipment	For more information...
SCSI cables*	See Appendix A for specifications.
SCSI jumpers*	
SCSI terminators*	
Power cord (if outside the U.S. or Canada)*	
Ethernet cable	
Fibre Channel cable	
Fibre Channel cable adapter	
Data cartridges*	See page 87.
Cleaning cartridges*	See page 25.
Bar code labels	To create your own labels, see the *Exabyte Bar Code Label Specification for DLT Cartridges.* To obtain information about reliable vendors, see Exabyte's web site (www.exabyte.com).
Rack-mount conversion*: 19-inch by 30- to 36-inch EIA standard rack with anti-tip support legs	Available from Exabyte or a commercial rack-mount vendor.

* To purchase these items, contact Exabyte or your service provider (see the inside back cover).

Step 4 – Prepare the host computer

Make sure your application software is compatible with the Exabyte 690D or the Exabyte 480. (See page 80 for information about the EXB-480 emulation option.) You can obtain software compatibility information about Exabyte products from Exabyte's web site (www.exabyte.com).

Note: You can install the software application on the host computer before or after library installation. However, if you install the software first, you may need to reconfigure it for use with the library.

Step 5 – Prepare the library for installation

Prepare the library as follows:

- Ensure that the work area is free from conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband during installation. If a wristband is not available, touch a known grounded surface, such as your computer's metal chassis.

- Locate an appropriate area for the library. The library must be positioned on a level surface near a readily accessible outlet. For proper cooling, allow 4 inches (10.2 cm) minimum clearance behind the library for adequate air flow.

Installing the library hardware

This section provides step-by-step instructions for installing the library hardware. You can use the table below as a checklist.

✔	Step	Description
	1	Install the library into a rack (rack-mount model only).
	2	Lock the wheels into place (standalone model only).
	3	Remove the packing foam and the attached cable clip.
	4	Install additional tape drives, if necessary.
	5	Install a cleaning cartridge.
	6	Attach labels to the magazine mounting plates.
	7	Prepare and install data cartridges.
	8	Connect the library to the SCSI bus.
	9	Connect the power cord.
	10	Power on the library.

Step 1 – Install the library into a rack (optional)

If you have a standalone library, go to the instructions on page 21 for Step 2. If you want to convert the standalone library to a rack-mount model, you can obtain rack-mounting hardware from Exabyte or a commercial vendor. A complete set of instructions is included with the rack-mounting kits available from Exabyte.

Installing the library into a rack involves removing the outriggers (that support the wheel casters) and the library's cosmetic covers. The library can then fit into a standard 19-inch EIA rack.

WARNING!

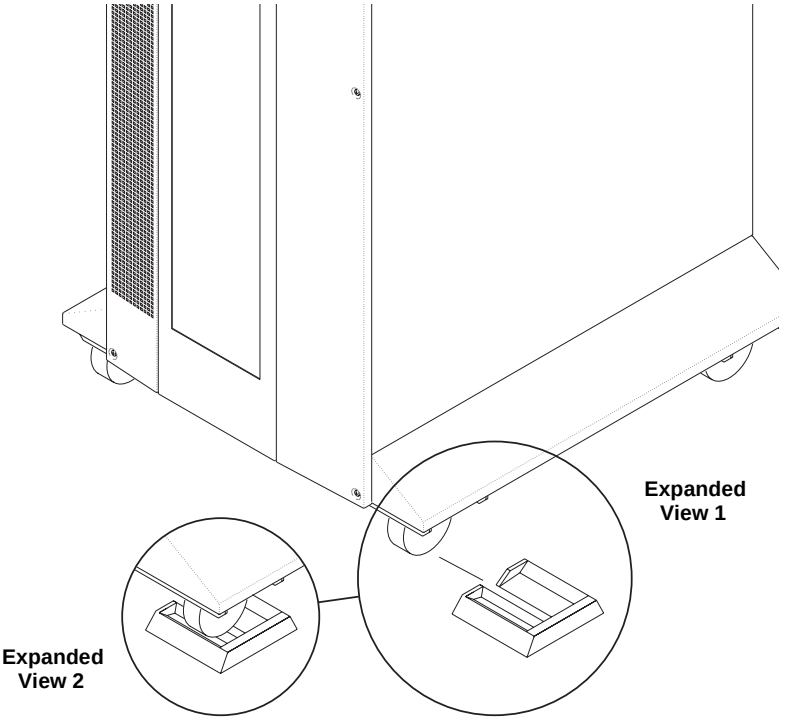
The library weighs 385 – 485 pounds (175 – 220 kg). You must use a mechanical lift to elevate the library before removing the outriggers.

Also, make sure to extend the rack's anti-tip support legs before installing the library into the rack.

Step 2 – Lock the wheels into place (standalone model only)

Once you have located an appropriate area for the library, lock the wheels into place by using the four wheel chocks provided in the accessory kit.

1. Position the open end of the wheel chock so that it faces the side of a wheel caster, as shown in Expanded View 1 of the following figure.

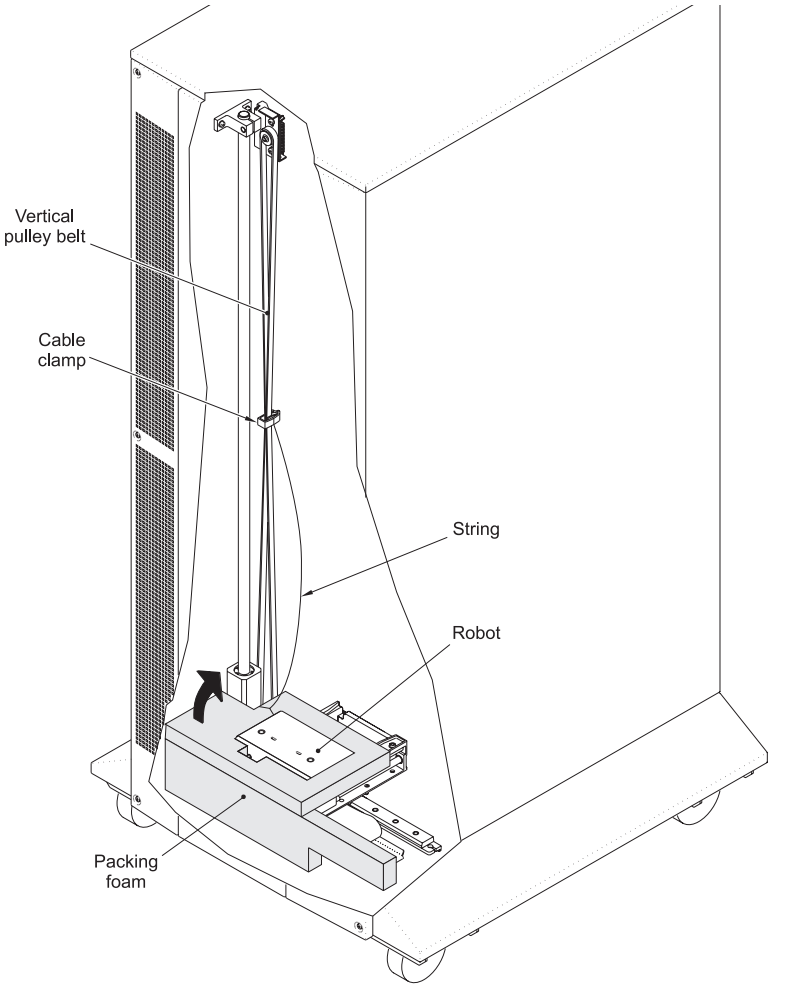


2. For each of the four wheels, slide the chock toward the wheel, then position the left and right side of the chock around the front and back of the wheel, as shown in Expanded View 2.

Step 3 – Remove the packing foam and cable clip

1. Insert the key in the lock of the library door, push in, and turn it one quarter turn clockwise. Open the library door.

2. From inside the door, locate the string attached to left side of the foam packing piece, as shown in the following figure.



3. Follow the string from the packing foam up to the cable clip attached to the robot's vertical pulley belt.

4. Release the cable clip so that it disengages from the pulley belt, and remove it from the belt.

5. Leaving the loop of string attached, snap the two sides of the clip together. Place the clip on top of the packing foam.

6. Grasp the packing foam, rotate it clockwise, and pull firmly. You can now remove the packing foam, the string, and the cable clip as one piece from the library.

7. Save the packing foam and the cable clip with the other library packing materials.

Step 4 – Install additional tape drives

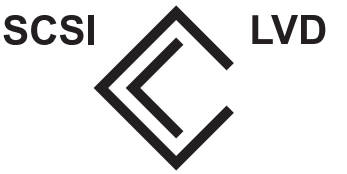
The library is equipped with a minimum of two DLT™7000 or two DLT 8000 tape drives. If you need to install additional tape drives in the library, see page 151.

CAUTION

Do not mix DLT 7000, DLT 8000 HVD, or DLT 8000 LVD tape drives in the library. Make sure all tape drives are the same type and model.

The SCSI symbols that distinguish between high-voltage differential (HVD) and low-voltage differential (LVD) are shown in the following figure.

High-voltage differential (HVD)



Low-voltage differential (LVD)

➤ **Important** Some software applications recognize new tape drives only if they are installed sequentially. See page 153 for information about sequential tape drive installation.

Step 5 – Install a cleaning cartridge

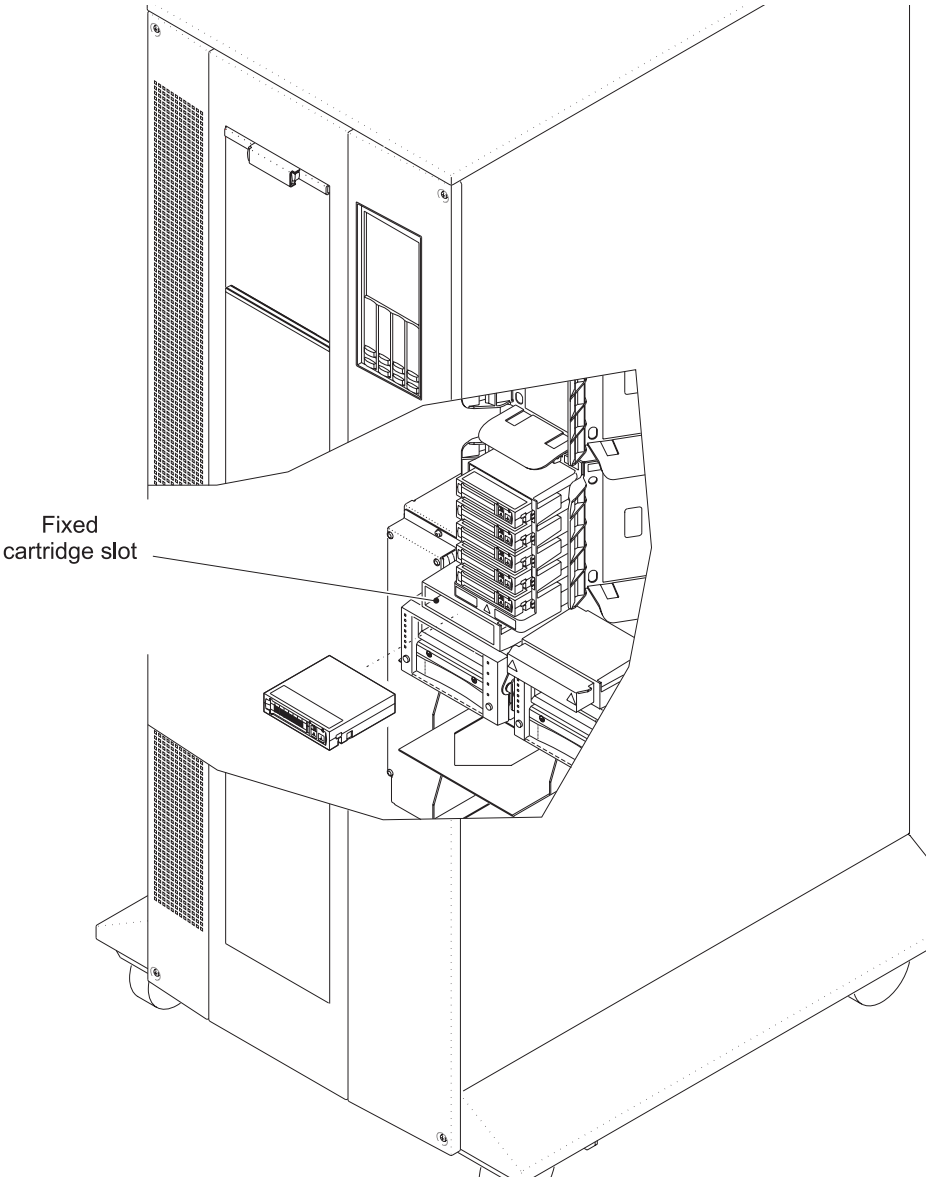
The library contains one fixed cartridge slot for a cleaning cartridge or an additional data cartridge. The location of the fixed cartridge slot is shown in the figure on the following page.

> **CAUTION**
>
> Use DLT™ Cleaning Tape III only. Using cloth swabs, cotton swabs, cleaning agents, or cleaning cartridges not approved for your tape drive by Exabyte may void the tape drive warranty.

To install a cleaning cartridge:

1. Position the cleaning cartridge horizontally with the spindle facing down and the label facing you. (This is the only way the cartridge can be inserted.)

2. Insert the cartridge into the fixed cartridge slot. Make sure the plastic tab in the slot moves into the indentation on the cartridge.



Step 6 – Attach labels to the mounting plates

The library is equipped with numbered labels that are attached to each mounting plate on the drum. You can attach additional labels that allow you to visually identify the magazine numbers and their corresponding cartridge slot numbers.

Each magazine number matches the corresponding mounting plate number. For example, magazine 0 is attached to mounting plate 0. Similarly, each cartridge slot number matches the corresponding element index number. For information about element index numbers, see page 163.

Remove the data cartridge magazines

To easily access the mounting plates, remove the data cartridge magazines.

1. Make sure the robot and its cabling are safely out of the way of the magazines. If necessary, move the robot to the bottom of the vertical axis by pushing firmly against its base.

2. Remove each cartridge magazine by pulling it out first from the top, then the bottom. (You can access back magazines by rotating the drum manually.)

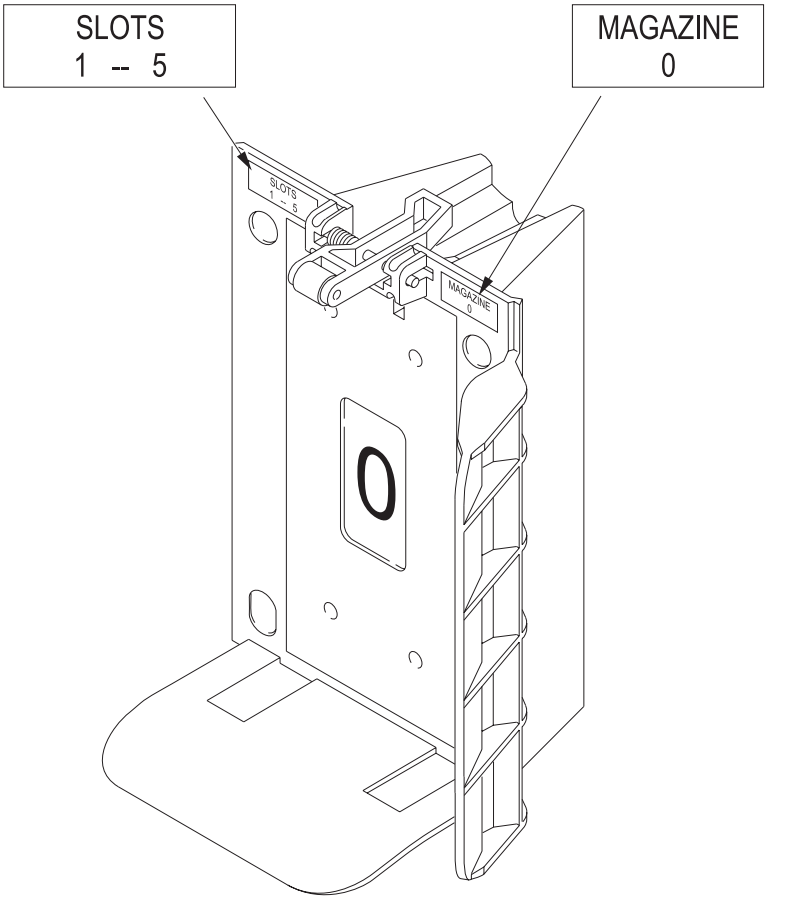
3. Repeat step 2 until you have removed all the data cartridge magazines from the library.

Attach the cartridge slot and magazine labels

1. Rotate the drum until mounting plate 0 is facing you.

2. On the upper left indentation of mounting plate 0, attach the Slots 1 – 5 label, as shown in the following figure.

3. On the upper right indentation of mounting plate 0, attach the Magazine 0 label.



4. Rotate the drum until mounting plate 1 is facing you.

5. Repeat steps 2 and 3 until you have attached cartridge slot labels and magazine labels to all of the mounting plates.

6. If your library contains fewer than 90 data cartridge slots, discard the remaining labels.

Step 7 – Prepare and install data cartridges

Exabyte recommends that you use Exatape™ DLTtape™ IV data cartridges.

> ➤ **Important** To ensure that your library will correctly read bar code labels, use bar code labels that contain checksum characters.
>
> Also, make sure the Verify Checksum option is set to ON. (See page 80 for information about this option.)

Follow these instructions to prepare and install data cartridges. You can use the table below as a checklist.

✔	Step	Description
	1	Determine whether your labels contain checksums.
	2	Attach the bar code labels.
	3	Set the write-protect switches.
	4	Install data cartridges in the magazines.
	5	Install magazines in the library.

Determine whether your labels contain checksums

Determine whether your bar code labels contain checksum characters by contacting your label vendor or by following these steps.

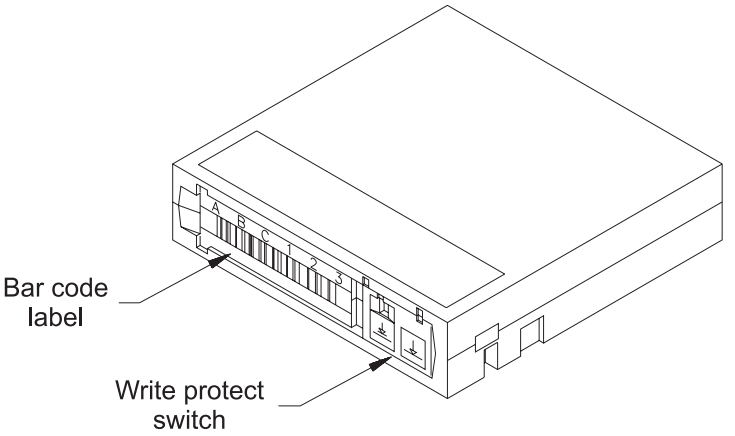
➤ **Important** If you create your own bar code labels, be sure to follow the specification precisely. For best results, use a reliable vendor to create bar code labels and use bar code labels that contain checksum characters.

1. Count the number of black bars on the label. (The number will be a multiple of 5.)
2. Divide this number by 5 to get the number of characters.
3. Subtract the number of human-readable characters on the label from the result of step 2. If the result is 2, the label does not include a checksum character; if the result is 3, the label includes a checksum character.
4. If the labels contain checksum characters, make sure to set the Verify Checksums option to ON in the SCSI Setup Menu (see page 80).

➤ **Important** If you use labels that do not contain checksum characters or if you mix labels containing checksum characters with labels that do not contain checksum characters, you must set the Verify Checksums option to OFF.

Attach bar code labels

To attach bar code labels to the cartridges, slide the label into the label slot, as shown in the following figure.

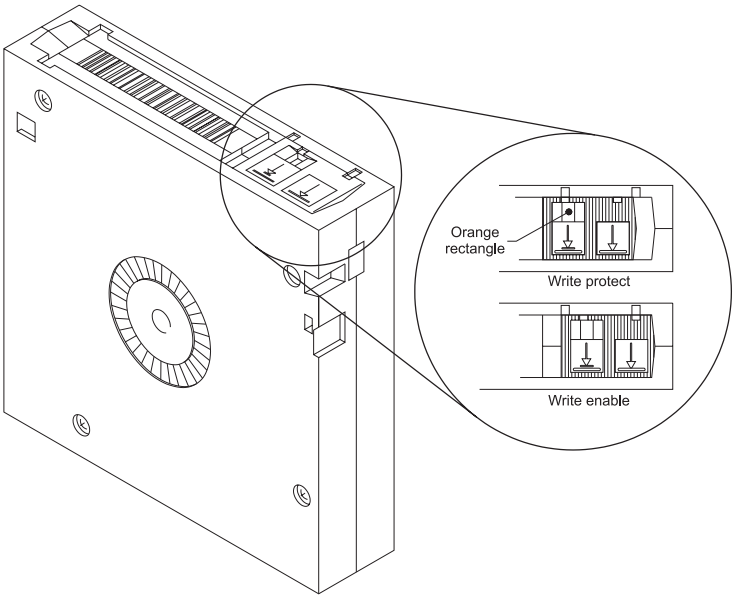


Set the write-protect switches

Make sure the write-protect switch on the cartridge is set correctly for your operation, as shown in the following figure. To do so, hold the cartridge so that the two arrows facing you are pointing down. (The write-protect switch includes both arrows and slides back and forth.)

- To write protect the cartridge, slide the switch to the left. This reveals an orange rectangle above the arrow.

- To write enable the cartridge, slide the switch to the right. This hides the orange rectangle.

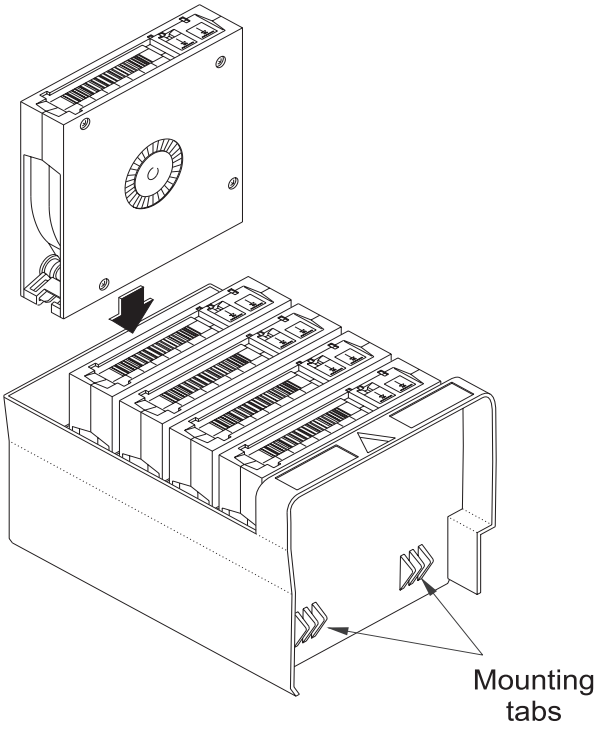


Install data cartridges in the magazines

1. Place the magazine on its feet with the two mounting tabs on your right.

2. Position each data cartridge with the bar code label and write-protect switch facing up, as shown in the following figure.

3. Insert the cartridge into the magazine slot. When the cartridge is seated, a plastic tab in the slot moves into an indentation on the cartridge.



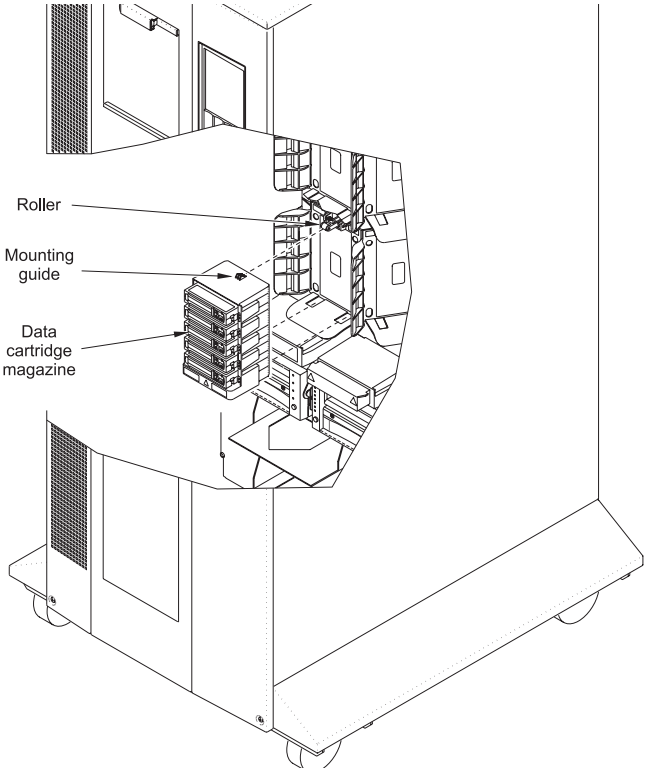
Note: Very little force is needed to install a data cartridge. If you experience problems, check the orientation of the cartridge.

Install magazines in the library

1. If necessary, manually rotate the drum to access the mounting plate where you want to install the magazine.

2. On the magazine mounting plate, locate the roller on the end of the plate.

3. Position the magazine so that the single mounting tab on the magazine is aligned with the roller on the mounting plate, as shown in the figure.



4. Insert the bottom end of the magazine first, then snap the magazine into place by pressing against the top.

5. Repeat steps 3 and 4 until you have installed all of the magazines.

6. Close and lock the library door.

Step 8 – Connect the library to the SCSI bus

This section provides general guidelines for connecting the library to the SCSI bus. The library consists of up to seven SCSI devices: the library itself and up to six tape drives. For information about SCSI cable specifications, see page 243.

➤ **Important** If you have an FC12 Fibre Channel to SCSI router installed inside your library, go to Appendix C for instructions on connecting the library and router to the SCSI bus. You can then skip the instructions below through page 42.

Before you begin

1. Make certain the host computer and any peripheral devices are turned off.

CAUTION

To avoid damaging the tape drives, make sure the tape drives and library are powered off when you connect the library to the SCSI bus.

2. If you are unfamiliar with connecting devices on a SCSI bus, especially issues concerning LVD and HVD configurations, read Appendix B.

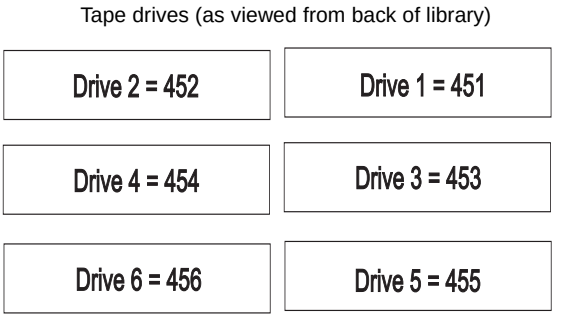
3. Determine the SCSI bus configuration (that is, how many SCSI buses you will connect to the library and which device you will connect to which bus).

4. Make sure you have the necessary SCSI cables, jumpers, and terminators to connect the library to the SCSI bus. (If you need any of these items, see the inside back cover to order them.)

Connecting the Exabyte 690D

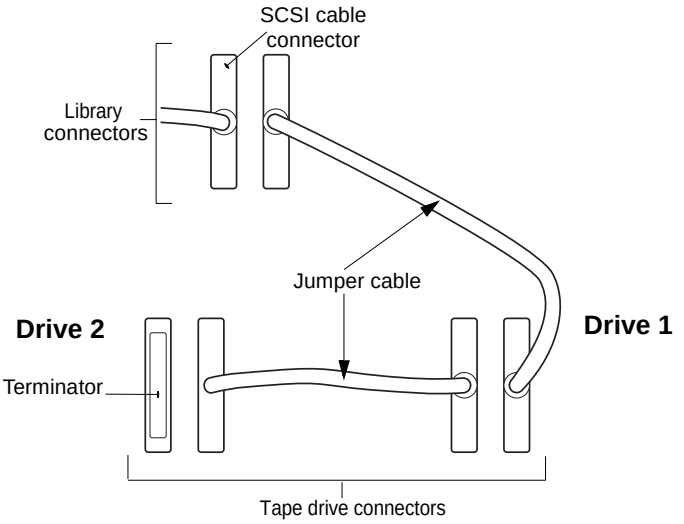
Your library contains between two and six tape drives. The following examples describe two possible SCSI connector configurations: the library connected to two tape drives, and the library connected to six tape drives. (Your configuration may differ depending on how many tape drives your library contains and the way you connect the library to the SCSI bus.)

The following figure shows the tape drives as viewed from the back of the library. You can refer to this figure when connecting the 690D library to the SCSI bus.



Connecting the library to one SCSI bus

If your library contains two tape drives, the library and each tape drive connector can operate on separate SCSI buses or on the same SCSI bus. This section describes how to connect a library containing two tape drives to one SCSI bus, as shown in the following figure.



1. Connect the host SCSI cable to the library SCSI connector.

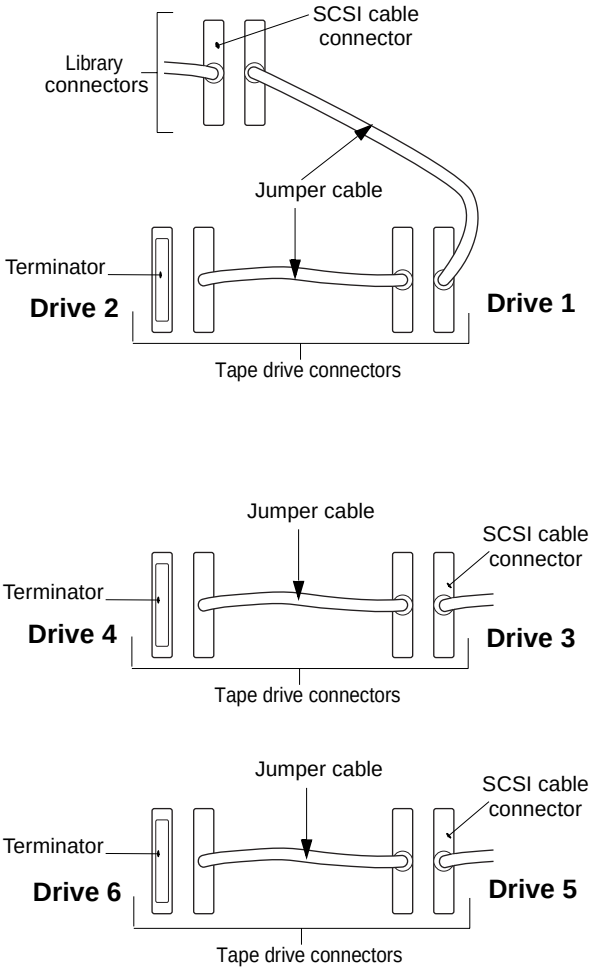
> ➤ **Important** When you attach the SCSI cables to the SCSI connectors, make sure you tighten the SCSI cable jack screws to no more than 2.0 inch-pounds (2.3 kg-cm) of torque.

2. Use jumper cables to connect the library and the tape drives to one SCSI bus. In the previous example shown on the previous page, a jumper cable connects the library to the first tape drive. A second jumper cable connects the first tape drive to the second tape drive.

3. Install a terminator over the last device on the SCSI bus. In the example shown on the previous page, the second tape drive is terminated.

Connecting the library to three SCSI buses

If your library contains six tape drives, the library and each tape drive connector can operate on separate SCSI buses or on the same SCSI bus. This section describes how to connect the library with six tape drives to three SCSI buses, as shown in the following figure.



1. Connect the host SCSI cable to the library SCSI connector.

> ➤ **Important** When you attach the SCSI cables to the SCSI connectors, make sure you tighten the SCSI cable jack screws to no more than 2.0 inch-pounds (2.3 kg-cm) of torque.

2. Use jumper cables to connect the library and the first two tape drives to one SCSI bus.

3. For the remaining drives, connect SCSI cables to the remaining SCSI cable connectors. In the example shown on the previous page, the SCSI cable connectors are installed on drive 3 and drive 5.

4. Use a jumper cable to connect drive 4 to drive 3 and another jumper cable to connect drive 6 to drive 5.

5. Install a terminator over the last device on each of the three SCSI buses. In the example shown on the previous page, a terminator is installed over drive 2, drive 4, and drive 6.

Step 9 – Connect the power cord

➤ **Important** The power cord shipped with the library is a 120 VAC three-conductor power cord for use in the United States and Canada. If you are planning to use an input voltage other than 120 volts AC or if you plan to use the library outside of the United States or Canada, you must supply your own power cord. Refer to page 241 for more information.

1. Make sure that the power switch on the back of the library is off (the **0** is pressed). See the figure on page 10 for the location of the power entry module.

2. Connect the female end of the power cord to the power connector on the back of the library.

3. Plug the male end of the power cord into the power source.

   Note: The library has autoranging voltage selection, so you do not need to change the voltage setting.

Step 10 – Power on the library

1. Make sure the library door is closed and locked.

2. Turn on the host computer system.

   Note: If your host system requires that attached peripheral devices be powered on before the host, turn on the library before you turn on the host.

3. Push the power switch on the back of the library to the on position (the **I** is pressed). See the figure on page 10 for the location of the power entry module.

4. Wait while the library performs its power-on sequence. During this time, the following activities occur:

   - The cooling fans begin to rotate.
   - The LCD illuminates and displays the Status Screen.
   - Each tape drive and the library perform a power-on self-test.

If problems occur...

If the library does not power on as described:	Check the following: ▪ Is the host computer system turned on? ▪ Is the library power switch on (**I**)? ▪ Is the power cord inserted correctly? ▪ Is the library door closed and locked? ▪ Are the SCSI cables firmly connected to the library and host computer? ▪ Are the SCSI buses terminated? ▪ Are all devices on the SCSI bus LVD or HVD (not mixed)? For additional troubleshooting tips, see “Library installation problems” on page 234.
If an error code is displayed on the LCD:	See Appendix D for a list of error codes and corrective actions.
If you cannot solve the problem yourself:	Contact your service provider or Exabyte.

Notes

3 Library Configuration

After installing the library hardware and application software, you must set the library's configuration options.

This chapter describes how to:

- Use the operator panel
- Access menus from the status screen
- Set basic configuration options
- Check the setup

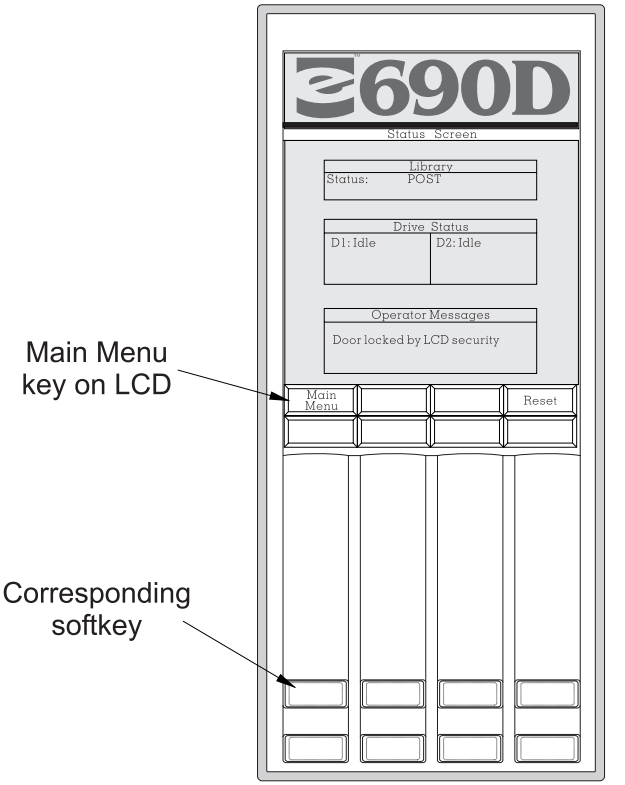
Using the operator panel

The library includes a 240 × 320 pixel LCD and keypad, called the *operator panel*, which allows you to interactively control library operations. Using the operator panel, you can set library options, check operating statistics, and diagnose errors.

LCD and keypad

The keypad contains a set of context-sensitive keys, called *softkeys*, located below the LCD screen. Softkey functions change as you navigate to different locations in the menu structure.

To select a menu option, press the softkey corresponding to the key position displayed on the LCD. For example, to access the Main Menu from the Status Screen (the first screen displayed when you power on the library), press the Main Menu softkey as shown in the following figure.

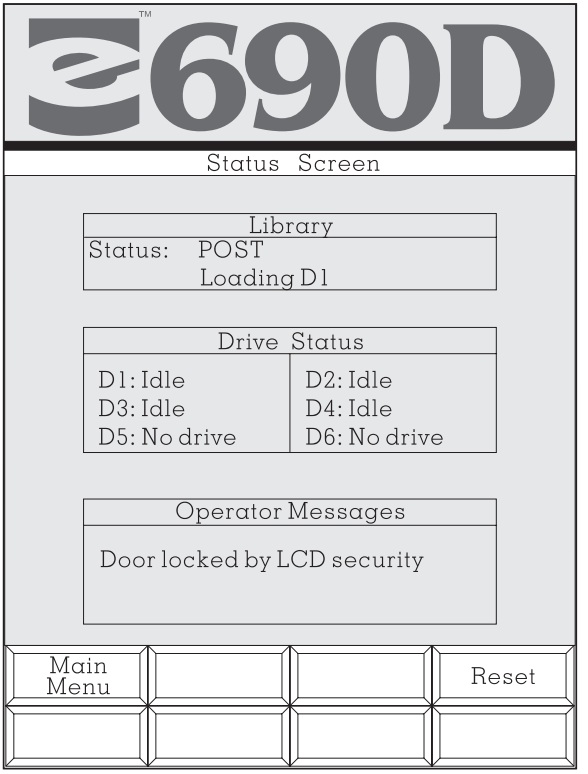


Accessing menus from the Status Screen

After the library performs a power-on self test, the Status Screen appears. The Status Screen contains the following information:

- Current library status
- Current tape drive status
- Operator messages

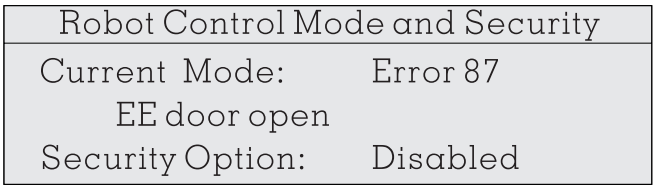
An example of the Status Screen is shown below.



Error codes

If a hardware error occurs, an error message will appear automatically on the Status Screen (see previous page) and in the Robot Control and Security box on other screens.

Two types of error codes can appear on the LCD: numbered and unnumbered error codes. Numbered error codes must be corrected before library operation can continue. (Refer to Appendix D for help in diagnosing and correcting numbered errors.) The following example shows a numbered error code and a brief explanation of the error.



Unnumbered error codes do not interrupt library operation. However, these errors should be corrected quickly to avoid possible damage to the library. For example, the failure of a tape drive fan will not stop library operation but could cause a drive component to overheat and malfunction.

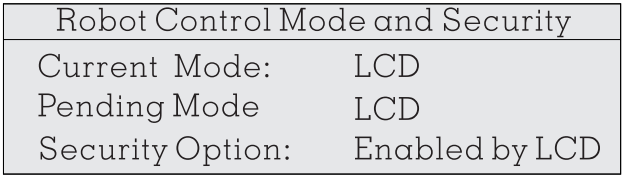
For a complete description of individual error codes (numbered and unnumbered), see Appendix D.

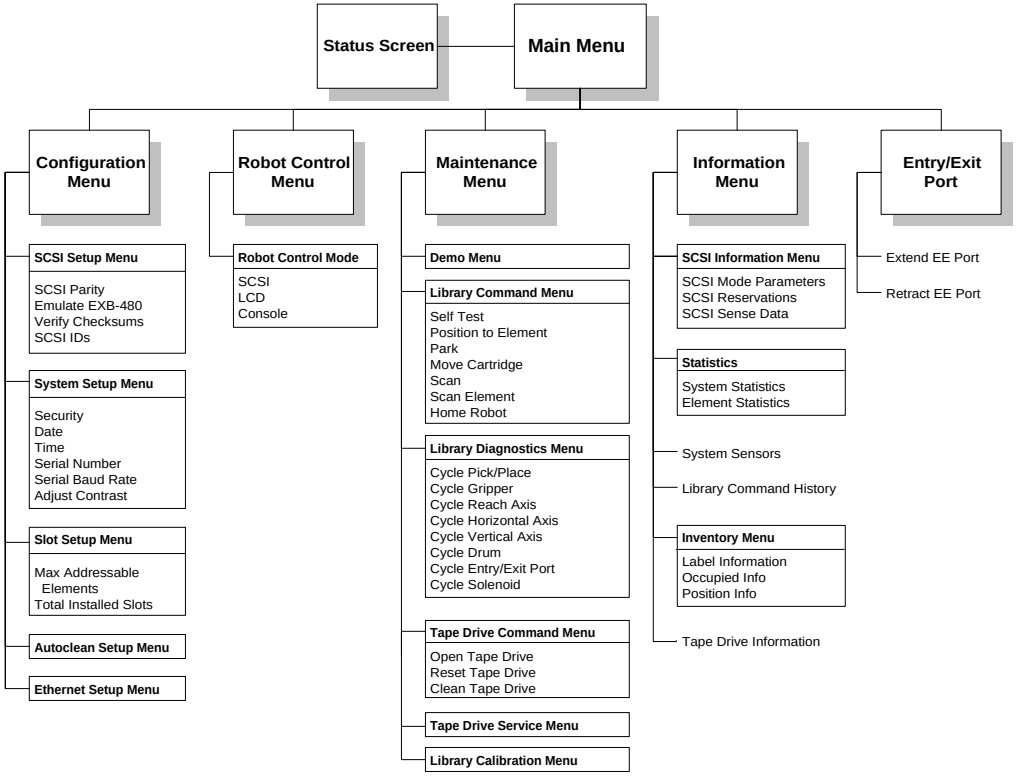
Main Menu

You can access the Main Menu from many locations in the menu structure. Selections available from the Main Menu are described in the following table. The menu structure is shown on the next page.

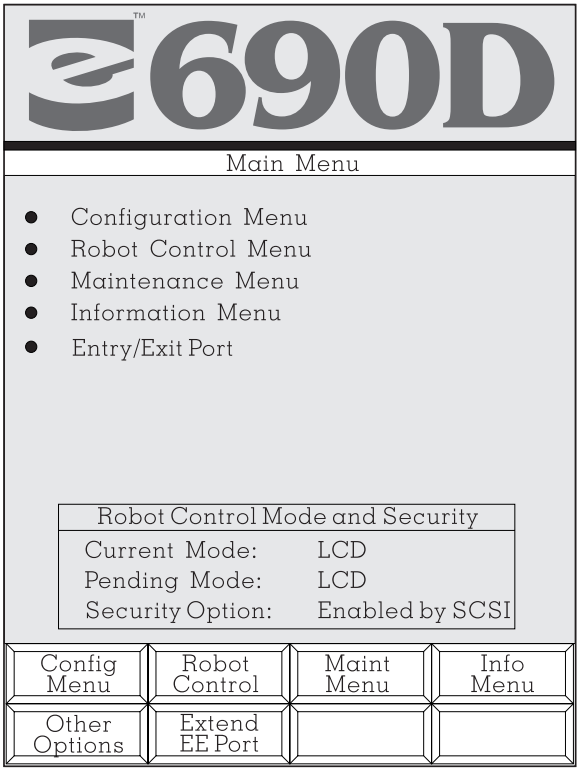
Main Menu selections	
Configuration Menu	Allows you to set SCSI IDs, security, and other configuration options.
Robot Control Menu	Allows you to change the robot control mode.
Maintenance Menu	Allows you to open the tape drives, clean the tape drives, and perform hardware exercises and diagnostics.
Information Menu	Provides tape drive status information and diagnostic information for service technicians.
Entry/Exit Port	Allows you to extend and retract the entry/exit port. (Extending the entry/exit port allows you to open the entry/exit port door; retracting the entry/exit port allows the robot to access cartridges in the entry/exit port magazine.)

The Main Menu screen also displays information about the robot control mode and security status, as shown in the following figure.



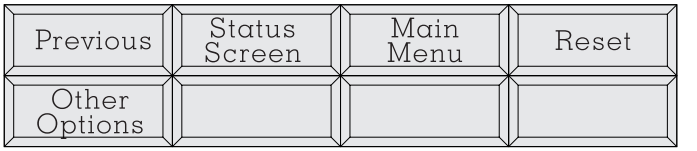

Status Screen
Main Menu
Configuration Menu
SCSI Setup Menu
SCSI Parity
Emulate EXB-480
Verify Checksums
SCSI IDs
System Setup Menu
Security
Date
Time
Serial Number
Serial Baud Rate
Adjust Contrast
Slot Setup Menu
Max Addressable Elements
Total Installed Slots
Autoclean Setup Menu
Ethernet Setup Menu
Robot Control Menu
Robot Control Mode
SCSI
LCD
Console
Maintenance Menu
Demo Menu
Library Command Menu
Self Test
Position to Element
Park
Move Cartridge
Scan
Scan Element
Home Robot
Library Diagnostics Menu
Cycle Pick/Place
Cycle Gripper
Cycle Reach Axis
Cycle Horizontal Axis
Cycle Vertical Axis
Cycle Drum
Cycle Entry/Exit Port
Cycle Solenoid
Tape Drive Command Menu
Open Tape Drive
Reset Tape Drive
Clean Tape Drive
Tape Drive Service Menu
Library Calibration Menu
Information Menu
SCSI Information Menu
SCSI Mode Parameters
SCSI Reservations
SCSI Sense Data
Statistics
System Statistics
Element Statistics
System Sensors
Library Command History
Inventory Menu
Label Information
Occupied Info
Position Info
Tape Drive Information
Entry/Exit Port
Extend EE Port
Retract EE Port

To access the Main Menu, press the Main Menu softkey from the Status Screen. The following screen appears:



Operator keys

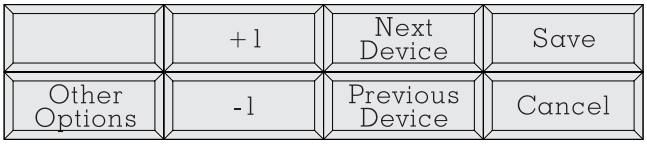
The softkeys on the operator panel are context-sensitive. That is, they perform different functions depending on your location in the menu structure. Certain softkey positions, however, remain consistent. For example, the Other Options key appears on all menu screens. When you press the Other Options softkey once, the following keys appear on the LCD:



These keys correspond to the following softkey functions:

Softkey	Function
Previous	Goes back one level in the menu structure
Status Screen	Returns to the Status Screen
Main Menu	Returns to the Main Menu
Reset	Displays the Reset screen, which allows you to reset the library and the tape drives
Other Options	Returns to the most previous screen

Other softkey functions remain consistent throughout the menu structure as well. For example, when you want to select SCSI IDs for the tape drives and library, the following key options appear on the LCD screen:



These softkeys perform identical functions in all menus and are described in the following table.

Softkey	Function
+1	Increases the unit value by one
-1	Decreases the unit value by one
Next Device or Next Digit	Scrolls to the next selection on the screen
Previous Device or Previous Digit	Scrolls to the previous selection on the screen
Save	Saves the current selection
Cancel	Cancels the current selection

Setting basic configuration options

You can access configuration settings through the Configuration Menu. Basic configuration steps include:

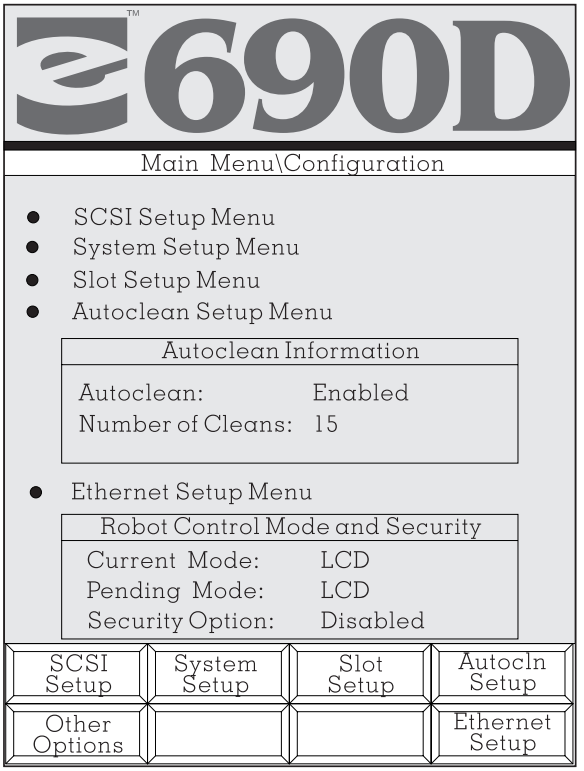
- SCSI IDs
- Library security

Displaying the Configuration Menu

To display the Configuration Menu:

1. From the Status Screen, access the Main Menu by pressing the softkey that corresponds to the Main Menu key displayed on the LCD.

2. Press the softkey corresponding to Config Menu on the LCD. The Configuration Menu appears:



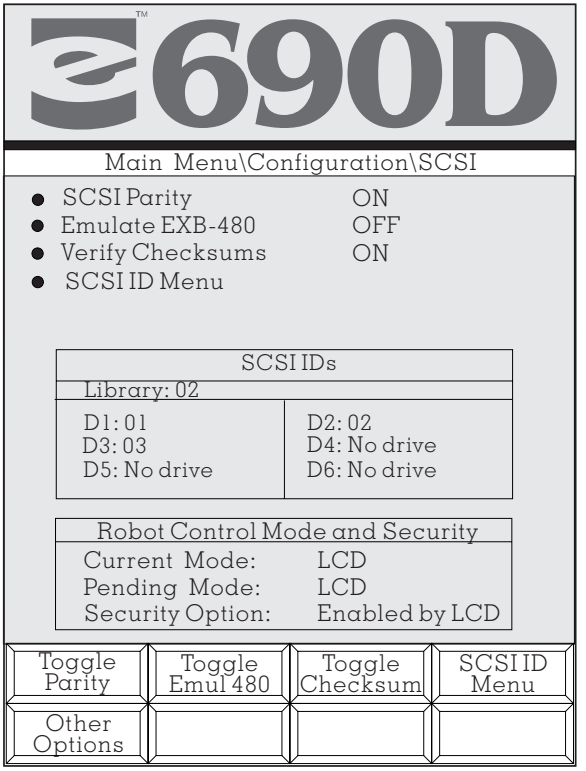
Setting SCSI IDs

Default SCSI IDs are assigned at the factory for the library and each tape drive. Empty drive slots are assigned a status of "No Drive." This section describes how to view the default settings and change them if necessary.

➤ **Important** The library and tape drives must each have a unique SCSI ID within each SCSI bus. Because you may have multiple buses, the library does not check for duplicate SCSI IDs. It is your responsibility to make sure you do not assign duplicate IDs within a bus.

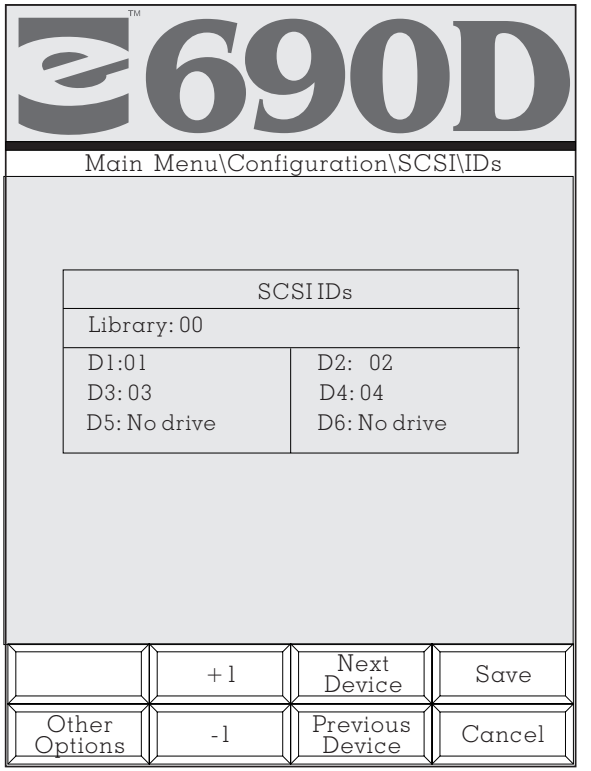
To view or change the SCSI IDs:

1. From the Configuration Menu, select SCSI Setup. The following screen appears:



➤ **Important** If you have an FC12 Fibre Channel to SCSI router installed inside your library, see the table on page 259 to verify you have the correct SCSI IDs needed to connect the library to the router. If necessary, you can change the SCSI IDs by following the steps below.

2. If, after viewing the IDs displayed on the SCSI Setup Menu, you want to change any of the IDs, press the SCSI ID Menu softkey. The SCSI ID Menu screen appears:



3. To set the SCSI ID for the library, press +1 or -1 until the screen displays the correct SCSI ID.

4. Press Next Device to go to Drive 1 (D1).

5. To set the SCSI ID for Drive 1, press the +1 or -1 softkey until the screen displays the correct SCSI ID.

6. Repeat steps 4 and 5 for all of the tape drives.

   Note: If a drive slot is empty, "No drive" appears next to the drive name, and you cannot change the SCSI ID.

7. When the SCSI IDs for all of the tape drives and the library are correct, press Save to accept your choices.

After you change the SCSI IDs and save the new settings, the library resets with the new IDs and returns to the SCSI Setup Menu. You do not need to power cycle the library to put the new SCSI IDs into effect.

Setting library security

The Security option allows you to prevent unauthorized personnel from disrupting the operation of the library. When you enable security, the following activities are prevented:

- Changing the library configuration settings
- Changing the robot control mode
- Using the operator panel to perform diagnostics or demos
- Using the operator panel to perform tape drive operations
- Calibrating the library
- Extending the entry/exit port (LCD security only; see page 61)
- Opening the front door (LCD security only; see page 61)

If you attempt to perform any of the above operations when security is active, the library displays a message that states security is enabled and that the selected operation cannot be performed until you disable security.

Methods for setting library security

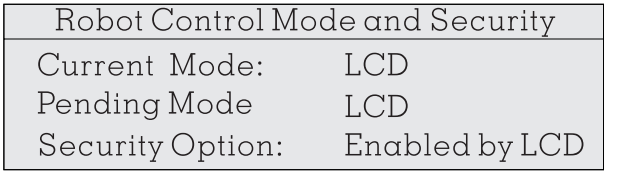
You can set library security in one of two ways:

- **LCD security.** LCD security is enabled and disabled from the operator panel using the Configuration Menu, as described in this section.

- **SCSI security.** SCSI security is enabled and disabled from the application software using a MODE SELECT command. However, SCSI security alone does not prevent the library door or the entry/exit port door from being opened or closed; you must use a PREVENT/ALLOW MEDIA REMOVAL command. For more information about SCSI security, see your software documentation or the *Exabyte 690D Library SCSI Reference*.

The method you use to enable security (LCD or SCSI) must also be used to disable security. That is, if you enable security from the operator panel (LCD), you must disable it from the LCD. If you enable security from the application software (SCSI), you must disable it from SCSI.

To determine how security has been set in the library, look at any LCD screen containing the Robot Control Mode and Security box at the bottom of the screen, as shown in the following figure.

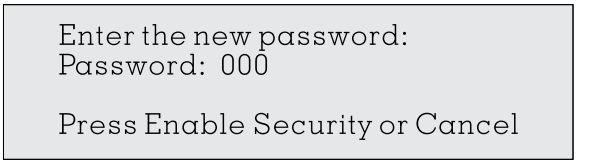


Security (enabled or disabled) remains in effect across resets and power cycles.

Enabling LCD security

1. From the Configuration Menu, select the System Setup Menu.

2. From the System Setup Menu, select the Security softkey. The following screen message appears:



3. Select a three-digit password. Press Next Digit and Previous Digit to move from column to column and +1 and -1 to change the numbers. (The default password is 000.)

➤ **Important** Remember or make note of the password you select to enable security; you must use the same password to turn security off.

4. When you are finished, press Enable Security. A confirmation message appears. Press the Save softkey. Or, to exit without enabling security, press Cancel.

Disabling LCD security

1. From the Configuration Menu, select System Setup Menu.
2. Press the Security softkey.
3. Enter the three-digit password you selected to enable security.

Note: If you forget the password, follow the instructions starting on page 228 to view the LCD password or contact your service provider.

4. Press Disable Security.

Note: Security may have been enabled by your application software using a SCSI command. If so, it must be disabled by your application software. Refer to your software documentation or to the *Exabyte 690D Library SCSI Reference*.

Checking the setup

After installing the hardware and software, check the setup by performing some exercises on the library, as described below. While these exercises are not required, it is a good idea to verify that your software and hardware are properly communicating before you begin operations.

- Use the options on the Library Command Menu to exercise the hardware. This determines whether the library hardware components are operating properly. See page 171 for more information about this menu.

- Instruct the application software to load some cartridges into a tape drive. This determines whether the software and library are communicating properly.

- Back up several megabytes of data to the tape drives and perform a comparison check on the backed up data. This determines whether the software and tape drives are communicating properly.

If problems occur . . .

If the library and tape drives are not operating as expected:	See Chapter 12 for troubleshooting information.
If there is an error code displayed on the LCD:	See Appendix D for a list of error codes and corrective actions.
If you cannot solve the problem yourself:	Contact your service provider or Exabyte.

Where to go from here

Before you begin library operations, check the following:

- ✔ The data cartridge magazines are installed.
- ✔ A data cartridge magazine is installed in the entry/exit port.
- ✔ The calibration block is stored in the calibration block slot.
- ✔ The robot gripper does not contain a cartridge.
- ✔ The library door is closed and locked.
- ✔ The library is in the proper control mode. The standard operating mode is SCSI (see page 84).

Notes

4 Optional Configuration

You can configure the library to include various optional features. You can set these options by selecting them from the library's Configuration Menu.

This chapter describes how to:

- Set the number of software slots
- Enable Autoclean
- Enable Ethernet access
- Set other configuration options

Setting the number of slots

This section describes how to configure the number of cartridge slots from the Slot Setup Menu on the library's front panel. You can use this menu to set two types of slot configurations:

- **Software slots.** The software slots setting, called *Max Addressable Element*, allows you to configure the library for the number of slots you want the software application to recognize.

- **Hardware slots.** The hardware slots setting, called *Total Installed Slots*, allows you to configure the library for the actual number of slots the library contains.

Setting the Max Addressable Element option

The Max Addressable Element option (software slots) allows you to decrease the number of slots your library reports to the software. This means that the library can use and report fewer slots than are physically present. This option is useful with software applications that offer scalable licenses based on the number of cartridges.

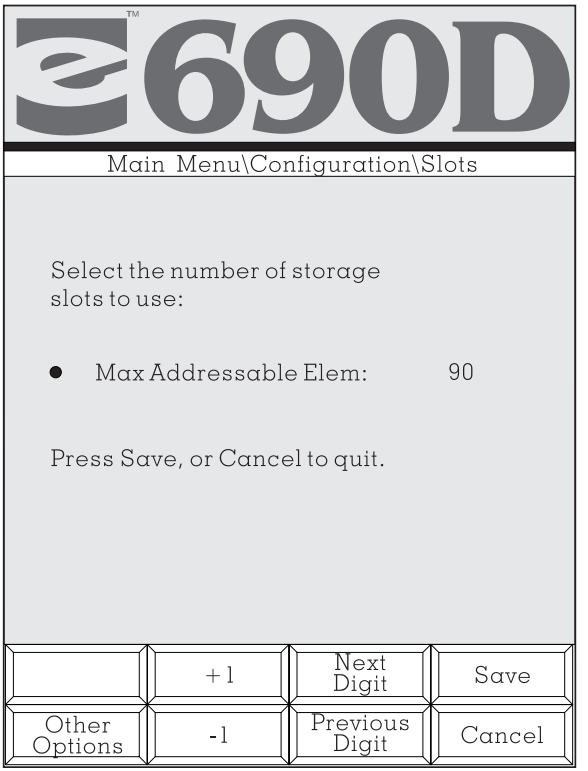
The Max Addressable Element default value equals the number of cartridge slots shipped with the library. You do not need to change this setting unless you want the library to report fewer slots to the software.

➤ **Important** If your software does not monitor the number of slots you are using, you do not need to set this option. Refer to your software documentation for more information.

To set the Max Addressable Element option, enter the highest element number that can store a cartridge. For example, if the software license you purchased supports 64 cartridges, set the Max Addressable Element option to 63. This tells the library to place cartridges in slot 0 through slot 63, resulting in 64 storage locations.

To change the Max Addressable Element value:

1. From the Configuration Menu, press Slot Setup, then press Set Max Address. The following screen appears:



2. Depending on how many total slots you want the software to recognize, press the appropriate softkeys. For example, if your library contains 90 cartridge slots and your software license supports only 64, enter a value of 63 (as explained on the previous page). Press the following softkeys:

   -1 three times
   Next Digit
   +1 three times, and so on.

3. Press Save, or press Cancel to quit.

Setting Total Installed Slots

The Total Installed Slots (hardware slots) default value is the number of cartridge slots shipped with the library. You do not need to change the hardware slots setting unless your library was shipped with less than 90 slots and you want to install additional slots. For more information, see page 134.

Enabling Autoclean

When you enable Autoclean, the library automatically cleans the tape drives whenever necessary. Autoclean does not interrupt normal library operation.

This section describes the following procedures:

- Selecting cleaning cartridges
- Enabling Autoclean
- Replacing a cleaning cartridge and re-enabling Autoclean
- Disabling Autoclean

➤ **Important** If you enable Autoclean, you must permanently store the cleaning cartridge in the fixed cartridge slot.

Note: Some software applications monitor the tape drive's cleaning needs and automatically insert the cleaning cartridge in the drive whenever it needs cleaning. If this is true in your case, you do not need to enable Autoclean.

Selecting cleaning cartridges

To order cleaning cartridges, contact Exabyte (see the inside back coversee the inside back cover).

CAUTION

Use DLT™ Cleaning Tape III only. Using cloth swabs, cotton swabs, cleaning agents, or cleaning cartridges not approved for your tape drive by Exabyte may void the tape drive warranty.

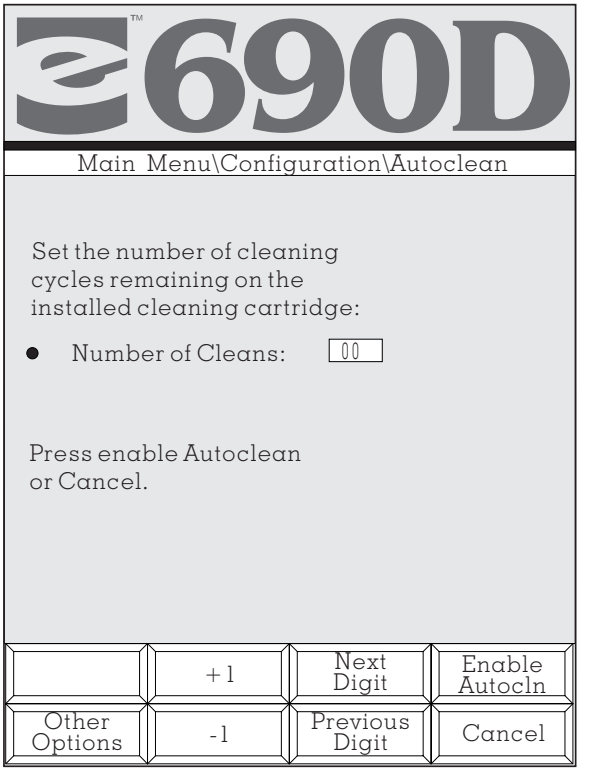
Enabling Autoclean

1. Make sure the fixed slot contains a cleaning cartridge.

➤ **Important** If the fixed slot contains a data cartridge (rather than a cleaning cartridge), Autoclean will fail and you will need to manually remove the data cartridge from the tape drive.

---

2. From the Configuration Menu, press [AutoCln Setup]. The following screen appears:



3. Determine the number of cleaning cycles that remain on your cleaning cartridge and use the softkeys to enter this number into the Number of Cleans field.

   Note: A new DLT Cleaning Tape III cartridge contains 20 cleaning cycles.

4. Press [Enable Autocln] to enable the Autoclean option, or press [Cancel].

Replacing a cleaning cartridge

After completing each cleaning cycle, the library decreases the Number of Cleans by one. When the Number of Cleans is zero, the library disables Autoclean. A message appears on the Status Screen, notifying you that the cleaning cartridge needs replacement.

➤ **Important** When you install a new cleaning cartridge, you must reset the Number of Cleans and re-enable Autoclean (see page 72).

Disabling Autoclean

To disable Autoclean:

1. From the Configuration Menu, press [Autocln Setup].
2. Press [Disable Autocln].

Enabling Ethernet access

This section describes how to establish an Ethernet connection so that you can access Exabyte's NetStorM™Library Monitor. (For more information about this software, see page 13.) Establishing an Ethernet connection involves the following procedures:

- Configuring the library's Ethernet connection
- Connecting the Ethernet cable
- Installing the NetStorM Library Monitor software

Note: You can also use an Ethernet connection to access the library's firmware via FTP. For more information about using FTP, see Chapter 11.

Configuring the Ethernet connection

To configure the library's Ethernet connection for communication with NetStorM Library Monitor software, you need to use the Ethernet Setup Menu, available from the library's front panel.

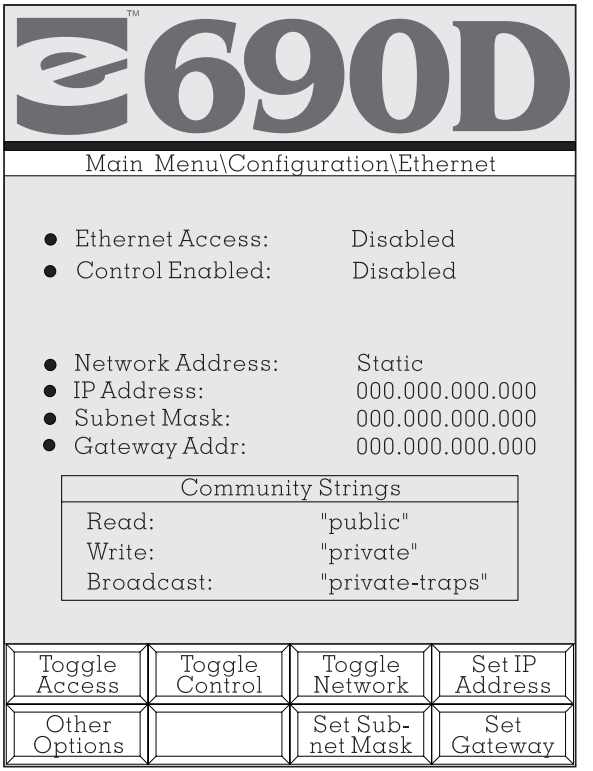
The following table describes the configuration options and settings that are available from the Ethernet Setup Menu.

Option	Description
Ethernet Access	Ethernet access to the library's data is allowed (enabled) or is prevented (disabled).
Control Enabled	Currently not a supported feature.
Network Address	The method used to set the IP address of the library (static or DHCP). A Static setting is recommended since DHCP may require periodic reinstallation of the NetStorM Monitor software.
IP Address	The IP address of the library, which allows information to be routed from the library to the server where the NetStorM Monitor software is installed.
Subnet Mask	The network subnet mask, which allows communication to be routed to designated devices within the network.
Default Gateway Address	The default TCP/IP gateway address, which allows communication to be routed outside the subnet.

To configure the Ethernet connection:

1. If necessary, disable security (see page 63).

2. From the Configuration Menu, press Ethernet Setup. The following screen appears:



➤ **Important** Wait until step 9 to enable Ethernet access. If you enable Ethernet access before configuring the library, you must power cycle the library after completing the following steps to ensure that the new settings will take effect.

3. To enable static IP addressing, press [Toggle Network] until the screen reads Network Address: Static.

4. To set the library's IP address, press [Set IP Address], then use the [+1], [-1] and [Next Digit], [Previous Digit] softkeys to enter the IP address of the library.

   Note: If you do not know the library's IP address, the subnet mask, or the default gateway address, contact your system administrator.

5. Press [Save], or press [Cancel] to quit.

6. Repeat steps 5 and 6 (this time pressing [Set Subnet Mask])to set the subnet mask.

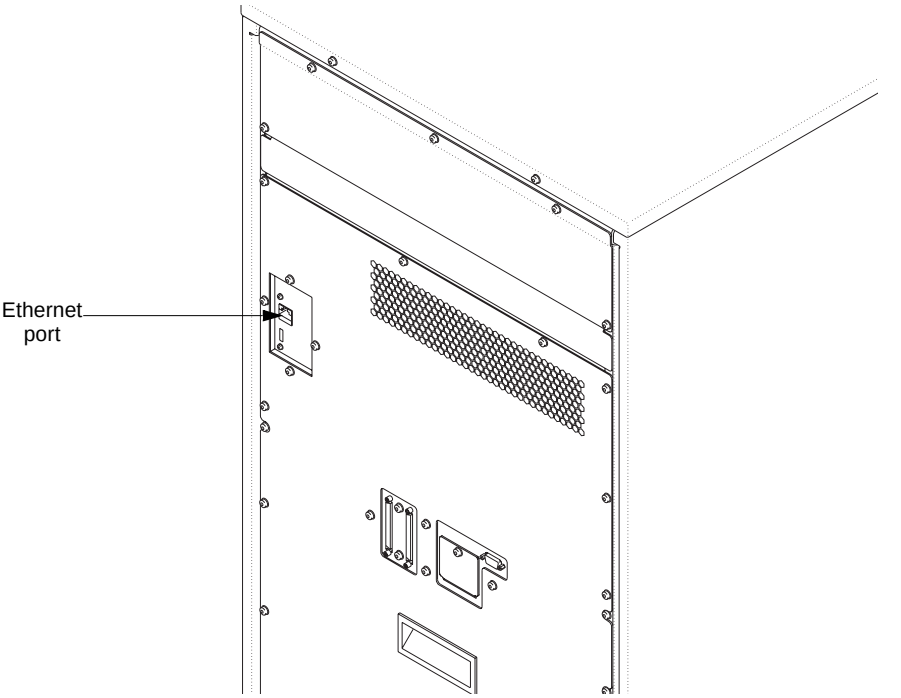
7. Repeat steps 5 and 6 (this time pressing [Set Gateway]) to set the gateway address.

8. Press [Toggle Access] until the first line of the screen reads Ethernet Access: Enabled.

9. Make note of the community string values. You will need these values to set writeable fields in the NetStorM Library Monitor interface. For more information about the community strings, see page 14.

Connecting the Ethernet cable

After setting the Ethernet configuration options, connect the library to the server by attaching an Ethernet cable to the Ethernet port. The Ethernet port is located on the back of the library, as shown in the following figure. (For Ethernet cable specifications, see page 246.)



To connect the Ethernet cable to the library:

1. Insert one end of the cable into the Ethernet port until you hear it snap into place.

2. Connect the other end of the cable to the server.

After you connect the Ethernet cable, you can check the Ethernet light-emitting diodes (LEDs) for information about the status of the Ethernet connection (see page 12).

Installing NetStorM™ Library Monitor software

You are now ready to install the NetStorM Library Monitor software. You can install NetStorM Library Monitor software from the CD that was shipped with the library. The CD also contains a readme file with software installation instructions.

Once you have installed NetStorM Library Monitor software on a host server, you can launch the Monitor from any client machine via a web browser. (For more information about how to launch NetStorM Library Monitor, see the readme file.)

For information about software upgrades, check Exabyte's web site (www.exabyte.com).

Setting other configuration options

You can select additional configuration settings from the SCSI Setup Menu and the System Setup Menu. Make sure these settings match your hardware and software configurations.

SCSI Setup Menu options

Menu options	Description
SCSI Parity*	Allows you to enable parity checking for the library (if the SCSI adapter card connected to the library supports it). When this option is enabled, the library checks all data coming across the SCSI bus for parity. The setting remains in effect across power cycles.
Emulate EXB-480	Allows you to set the library to emulate an Exabyte 480 library. In this mode, the library returns "EXB-480" in response to a SCSI INQUIRY command. This allows you to use most (but not all) application software packages that provide a driver for the Exabyte 480 library but not for the Exabyte 690D.
Verify Checksums	Allows you to specify whether your bar code labels include a checksum character (see page 30). When this option is ON (the default setting), the library expects to find a checksum character on each label. When this option is OFF, the library does not look for checksum characters. **Important:** To ensure that your library will correctly read bar code labels, use bar code labels that contain checksum characters.

* Parity checking for the library can also be enabled by the application software using the SCSI command, MODE SELECT. The method used last to set parity checking (LCD or SCSI command) has precedence. Parity checking for tape drives is set separately.

System Setup Menu options

Menu options	Description
Date	Allows you to set the system date for the library. The date appears on the Library Command History screen (see page 198 for more information).
Time	Allows you to set the time that is shown on the library's Status Screen and Command History screen (see page 198 for more information).
Serial Number	Allows you to verify that the serial number label on the back of the library is also displayed in this screen, and allows you to change the serial number.
Serial Baud Rate	Allows you to set the baud rate for communication through the library's serial port.
Adjust Contrast	Controls the background and lettering contrast on the LCD.
Number of Slots	Allows you to increase the number of data cartridge slots recognized by the library after upgrading to a 60- or a 90-cartridge library. (The default value for this field is the number of cartridge slots shipped with the library.)

Notes

5 Library Operation

Once the library is configured for operation, you can use the application software to automatically perform backup and restore operations.

During a typical backup and restore operation, there is no need for you to intervene. However, you may need to occasionally perform the following library operations:

- Determine robot control modes
- Replace data cartridges
- Reset the library

Determining the robot control modes

To determine which interface will control robot motion, you can set the library to one of the following control modes:

- SCSI
- LCD
- Console

These modes allow you to control robot motion in the library with the application software (SCSI mode), the operator panel (LCD mode), or a remote console program (Console mode).

The following sections describe robot control modes for the library. Instructions for changing the control mode begin on page 85.

Note: Robot control mode settings remain through resets and power cycles.

SCSI mode

If you want to control robot movement using the application software, you must set the library to SCSI mode. In this standard operating mode, the application software controls the motion of the robot by issuing SCSI commands across the SCSI bus.

Note: The application software can issue SCSI commands to the library regardless of the control mode. However, the library must be in SCSI mode for the application software to control robot motion when it issues cartridge movement commands.

For detailed information about SCSI commands, refer to the *Exabyte 690D Library SCSI Reference.*

LCD mode

If you want to control robot movement from the operator panel, you must set the library to LCD mode. Operations that use LCD mode to move the robot (such as cleaning the tape drives and performing hardware exercises) are accessed from the Maintenance Menu.

Note: You can use many operator panel features without changing to LCD mode. LCD mode is required only when you want to control the motion of the robot from the LCD.

Console mode

To control robot movement from Console mode, the library must be connected to a remote terminal through the serial port. Controlling robot movement from Console mode is typically used only by service providers.

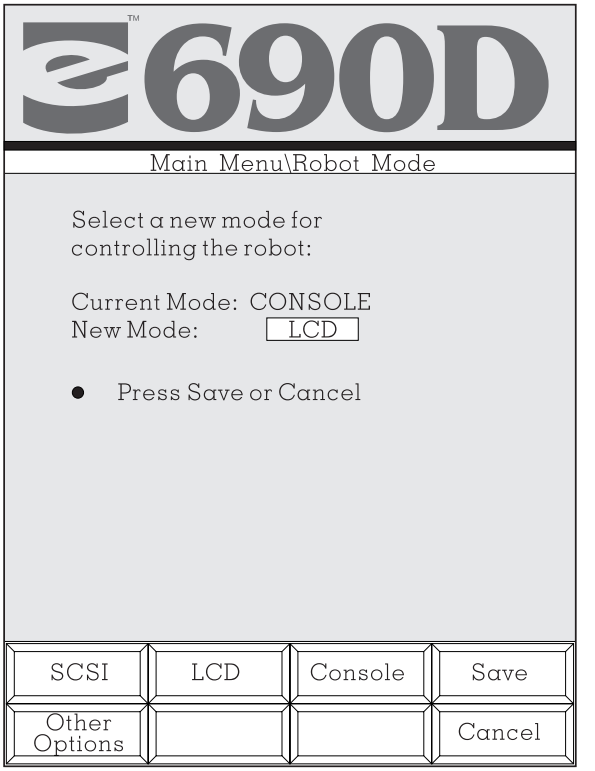
You do not need to switch to Console mode if you want to upgrade the firmware or create diagnostic listings. For more information about firmware upgrades and diagnostic listings, see Chapter 11.

Changing the control mode

1. Make certain the library is in the ready state (for example, no hardware errors, the door is closed, and so on).

2. If security is enabled, disable it (see page 63).

3. From the Main Menu, select Robot Control Menu. The following screen appears:



4. Select the desired mode by pressing the appropriate softkey.

➤ **Important** When the library is in LCD mode or in Console mode, the software application cannot control robot movement.

5. Press Save to activate the robot control mode you have selected.

Selecting and replacing data cartridges

This section describes how to:

- Select the appropriate data cartridges for your tape drive
- Replace a single cartridge
- Replace the cartridge magazines
- Store cartridges outside the library

Selecting data cartridges

Exabyte recommends that you use Exatape™ DLTtape™ IV Data Cartridges. Exatape media meets specifications that are the most stringent in the industry.

When used in a DLT 7000, a single Exatape IV Data Cartridge provides 35 gigabytes (GB) native storage capacity and 70 GB with 2:1 data compression.

When used in a DLT 8000, a single Exatape IV Data Cartridge provides 40 gigabytes (GB) native storage capacity and 80 GB with 2:1 data compression.

Note: DLT 8000 drives can read and write DLT 7000 media. However, DLT 7000 drives cannot read or write media that was previously recorded on DLT 8000 drives.

Replacing data cartridges

To replace individual data cartridges, use the entry/exit port (EE port). The EE port contains a magazine that can hold up to five data cartridges. (To replace data cartridge magazines, see page 90.)

➤ **Important** Do not open the library door to replace individual cartridges. Opening and closing the library door causes the library to perform a complete cartridge inventory process.

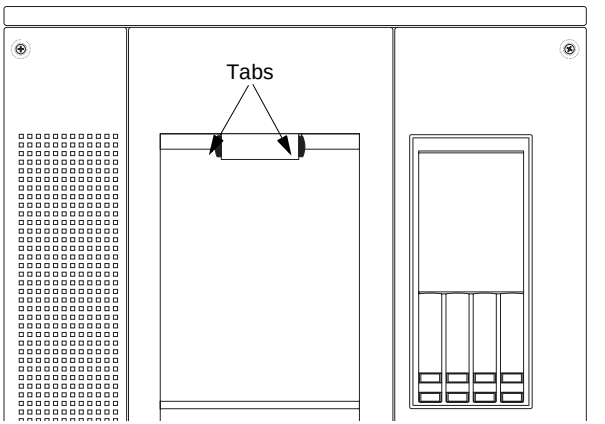
Inserting cartridges into the EE port magazine

1. If necessary, disable security (see page 63).

2. From the Main Menu, press the Extend EE Port softkey. The library extends the entry/exit port, which moves the data cartridge magazine toward the EE port door.

➤ **Important** You must extend the EE port before you can open the EE port door.

3. Open the EE port door by pressing in on the tabs located on either side of the door handle, as shown in the following figure.



4. Lower the EE port door, and insert up to five cartridges into the EE port magazine.

5. Raise the EE port door until the latch engages.

6. To retract the EE port (so that the robot can access cartridges in the entry/exit port magazine), press the Retract EE Port softkey.

> ➤ **Important** You must retract the EE port so that the robot can inventory and access the cartridges in the EE port magazine.

7. To move cartridges to empty slots in the library, use the application software or the Move Cartridge command (see page 173).

Removing cartridges from the EE port magazine

1. Use the application software or the Move Cartridge command to move up to five cartridges from the storage slots or drives to the EE port magazine.

2. Follow steps 1 through 4, starting on page 88.

3. Remove the cartridges from the EE port magazine.

   Note: You can remove the entire data cartridge magazine, but you must replace it if you want to be able to move cartridges to and from the EE port.

4. Raise the EE port door until the latch engages.

5. To retract the EE port (so that the robot can access cartridges in the EE port magazine), press the Retract EE Port softkey.

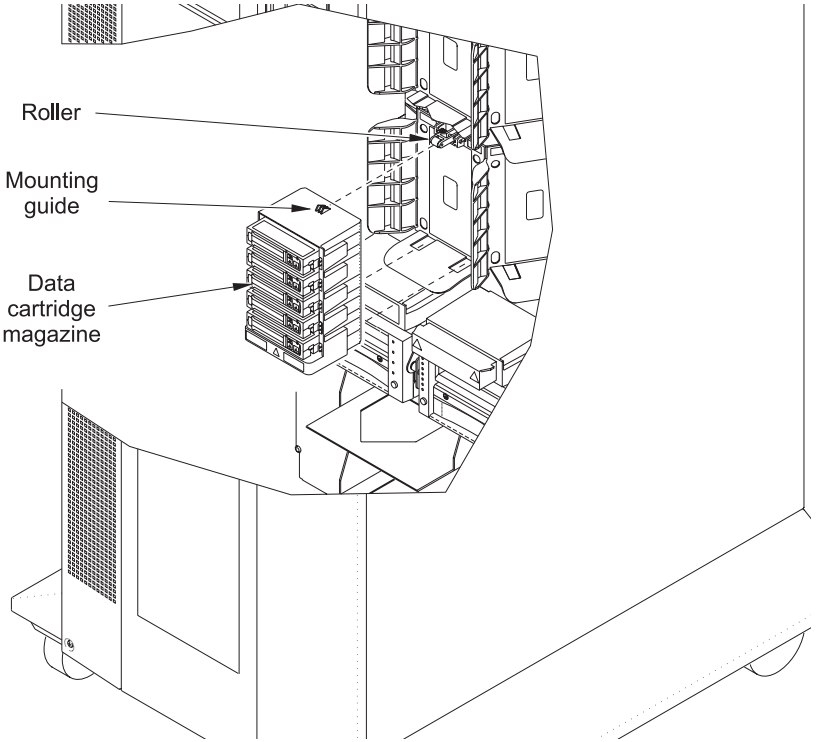
Replacing data cartridge magazines

1. Turn the key in the library door one quarter turn clockwise.
2. When the door's interlock mechanism releases, open the door.

> **CAUTION**
>
> Do not force the library door open. The door's interlock mechanism may be prevented from releasing by LCD security, laser scanner operation, a SCSI PREVENT/ALLOW MEDIA REMOVAL command, or by the application software.

3. Make sure the robot and its cabling are safely out of the way of the magazines. If necessary, move the robot to the bottom of the vertical axis by pushing firmly against its base.
4. Remove the cartridge magazine by pulling it out first from the top, then the bottom. (You can access back magazines by rotating the drum manually.)
5. Replace the cartridges, if necessary (described on page 87).

6. Position the magazine so that the single mounting tab on the magazine is aligned with the roller on the mounting plate, as shown in the figure on the opposite page. Clip the magazine onto the bottom and snap it into place by pressing on the top.



7. Repeat steps 4 to 6 to replace additional data cartridge magazines.

8. Close and lock the library door.

Note: If your library contains 6 or 12 data cartridge magazines (30 or 60 cartridge slots), you can obtain a magazine upgrade kit that increases the library's capacity by 30 cartridge slots (see the inside back cover).

Storing data cartridges

To maximize the shelf life of your tapes and ensure data integrity, follow these guidelines when storing cartridges:

- **Store cartridges in a suitable environment**. Follow the specifications for storage temperature and other environmental requirements, as described on the cartridge packaging. Do not allow the temperature and humidity in the storage environment to fluctuate.

- **Keep the storage location as free of airborne particulates as possible**. To eliminate obvious sources of particulates, do not permit anyone to smoke, eat, or drink near the storage area, and do not store cartridges near a copier or printer that may emit toner and paper dust.

- **Store cartridges with the write-protect switch in the protected position**. See page 32 for information about setting the write-protect switch.

- **Store cartridges as soon as possible after you remove them from the library.** Immediate storage helps avoid many of the conditions that can damage tapes, such as temperature and humidity fluctuation, particulate contamination, and excessive handling.

- **If possible, store cartridges in a cartridge magazine**. In the cartridge magazine, cartridges are protected from airborne contaminants by a clear plastic cover. With the cover in place, the magazines can be stacked on top of each other to make the most efficient use of storage space.

Resetting the library

You may need to reset the library to put new settings into effect or to clear a hardware error. A reset causes the library and the tape drives to perform their power-on self tests. The tape drive will rewind the tape after a reset but will not eject the data cartridge.

> **CAUTION**
>
> Before resetting the library, make sure the library or tape drives are not communicating across the SCSI bus. Resetting the library may disrupt communications on the SCSI bus.

To reset the library, you can use one of the following methods:

- From any screen, select Other Options. Press Reset, then press Reset again at the confirmation screen.
- Perform a power-on reset by turning the library off, then back on.

Note: The library, tape drives, or the entire SCSI bus can also be automatically reset by the host.

When the library is reset from the front panel, the library performs a power-on self-test (POST). The Status Screen appears on the LCD as soon as POST begins.

Note: If the library is performing a cartridge move operation when it is reset, it completes the move operation before performing POST.

Notes

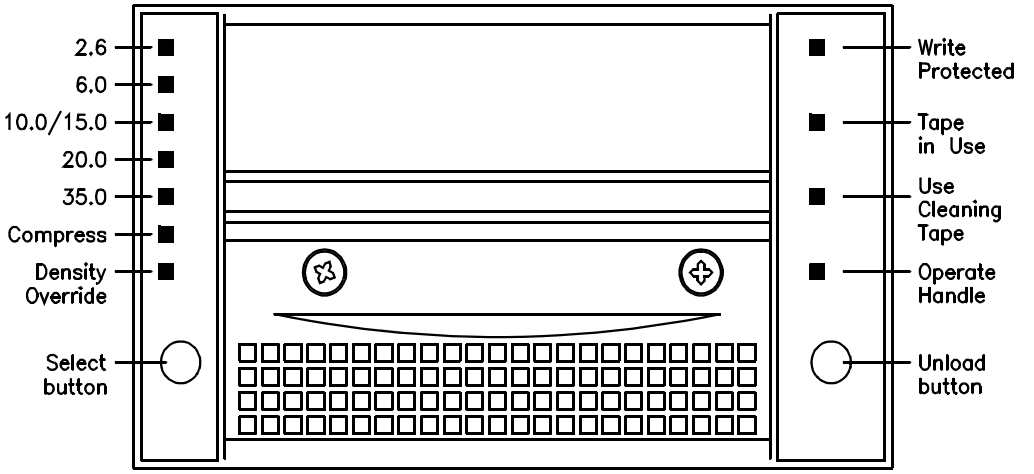
6 Tape Drive Operation

The application software automatically controls the tape drive to perform backup and restore operations. You do not need to intervene in the cartridge processing; however, you may need to perform the following tasks:

- Monitor the tape drive LEDs
- Open a tape drive
- Reset a tape drive
- Clean a tape drive
- View tape drive information
- View tape drive statistics

Monitoring the tape drive LEDs

This section describes the indicators and controls for the DLT tape drives. The figure below shows the DLT™ 7000. The DLT 8000 looks similar to the DLT 7000 except that the numeric LEDs on the left are 10.0/15.0, 20.0, 35.0, and 40.0.



The tape drive uses light emitting diodes (LEDs) to indicate its operating states. Normally, you do not need to monitor the LEDs when the tape drive is installed in the library; however, basic LED states are described below for your reference.

Label	LED state	Description
2.6[a] 6.0[a] 10.0/15.0 20.0 35.0 40.0[b]	Yellow on	The current format (or "density") of data on this tape. For example, if the current format of this tape is 20.0, the 20.0 LED is on. If the software is changing the format of the tape during the current write session, the LED for the old format remains lit while the LED for the new format blinks (see "Yellow blinking" below).
	Yellow blinking	If the software is writing in a data format other than the format previously used on this tape, the new format is indicated with a blinking LED. For example, if the tape was previously written in 20.0 and is currently being written in 35.0, the 20.0 LED remains lit while the 35.0 LED blinks. **Note:** The software can only change the tape format at BOT (beginning-of-tape).
Compress	Yellow on	During a read or write operation, this indicates that the data is compressed.
	Off	During a read or write operation, this indicates that the data is not compressed.

[a] DLT 7000 only; [b] DLT 8000 only.

Label	LED state	Description
Density Override	Yellow on	The data is being written in the format (or “density” specified manually using the Density Select (or Select) button on the front panel. **Note:** Although you are not prohibited from doing so, using the Density Select button is not recommended for tape drives operating in a library.
	Off	The data format is selected by the application software.
Write Protected	Orange on	The tape is write-protected.
	Off	The tape is write-enabled.
Tape in Use	Yellow blinking	The tape is moving.
	Yellow on	The tape is loaded; ready for use.
Use Cleaning Tape	Yellow on	The drive head needs cleaning, or the tape is bad.
	Yellow remains on after you remove cleaning tape.	The cleaning tape may be used up. Try a new cleaning cartridge.
	After you clean the tape drive and insert the data cartridge, the yellow LED goes on again.	There may be a problem with the data cartridge. Try another cartridge. If the problem persists, contact your service provider.
	Off	Cleaning is complete, or no cleaning is required.

Label	LED state	Description
Operate Handle	Green on	It is okay to operate the tape drive handle.
	Off	Do not operate the tape drive handle.
All on left side or all on right side	Blinking	A power-on self-test (POST) or other error has occurred.
	On	POST is beginning.
	Off	POST is complete.

Opening a tape drive

During normal library operations, the robot automatically inserts cartridges into the tape drive and removes them, as required. If you need to manually remove a data cartridge from the tape drive, follow these instructions to open the tape drive.

CAUTION

Do not open the library door and attempt to unload the tape drive using the Unload button on the faceplate of the tape drive. Pressing the Unload button *does not* eject the data cartridge; the tape drive is still "closed."

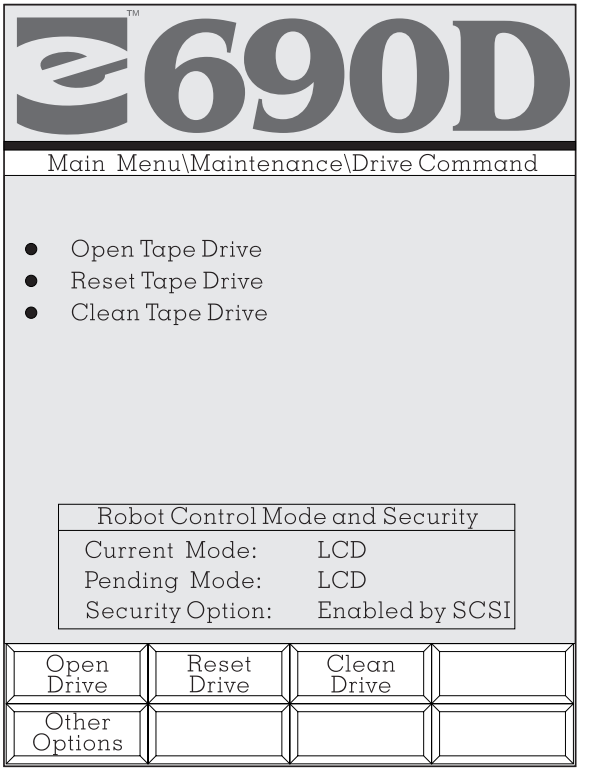
Do not attempt to open the tape drive manually by moving the handle. Manually forcing the handle to open or close the tape drive can damage the tape drive and may cause injury.

To open a tape drive:

1. If security has been enabled, disable it (see page 63).

2. Switch to LCD mode (see page 85).

3. From the Maintenance Menu, select Tape Drive Command Menu. The following screen appears:



4. Press Open Drive.

5. To open Tape Drive 1, press Start. To open another tape drive, press the following softkeys:

   Set Dest
   +1 (until you reach the tape drive that you want to open)
   Save
   Start

   When you do so, the tape drive unloads the tape. After the tape is unloaded (the Operate Handle LED will blink), the robot opens the tape drive handle.

Resetting the tape drive

If the tape drive has stopped operating and does not respond to the application, follow these instructions to reset the tape drive.

1. If security has been enabled, disable it (see page 63).

2. From the Maintenance Menu, select Tape Drive Command Menu and then Reset Tape Drive.

3. To reset Tape Drive 1, press the Start softkey. To reset another tape drive, press the following softkeys:

   Set Dest
   +1 (until you reach the tape drive that you want to reset)
   Save
   Start

Cleaning a tape drive

You can clean the tape drives in the library in one of three ways:

- Enable Autoclean. (For more information about the Autoclean option, see page 70.)
- Allow the software application to monitor and clean the drives. (Not all software applications monitor cleaning requirements.)
- Clean the tape drives manually from the operator panel.

If you clean the tape drives manually, you should clean them when any of the following conditions occur:

- The library displays a Clean Drive message next to the drive number on the Status Screen of the LCD.
- The library displays a Clean indicator on the LCD line of the Tape Drive Information screen (see page 108).
- The tape drive's top LED is on (see page 97).
- Your application software notifies you. (Not all software applications display cleaning requirements.)

Selecting cleaning cartridges.

Use only DLT CleaningTape III. To order cleaning cartridges, contact Exabyte (see the inside back cover).

> **CAUTION**
>
> Do not use cloth swabs, cotton swabs, cleaning agents, or cleaning cartridges not approved for your tape drive.

Cleaning a tape drive from the operator panel

To clean a tape drive from the operator panel:

1. If necessary, disable security (see page 63).
2. Switch to LCD mode (see page 85).
3. Make sure a cleaning cartridge is installed in the fixed cartridge slot.

> ➤ **Important** Before you begin cleaning a tape drive, make sure the fixed slot contains a cleaning cartridge (rather than a data cartridge). If the fixed slot contains a data cartridge, the Clean Tape Drive command will fail, and you will have to manually unload the cartridge from the drive (see page 99).

4. From the Maintenance Menu, select Tape Drive Command Menu, then Clean Tape Drive.

5. To clean Tape Drive 1, press Start. To clean another tape drive, press the following softkeys:

   Set Dest
   +1 (until you reach the tape drive you want to clean)
   Save
   Start

   When you select a drive, the following activities occur:

   - The robot picks the cleaning cartridge from the fixed slot and inserts it in the tape drive.
   - The tape drive automatically performs the cleaning process and unloads the cartridge when the process is complete. This may take several minutes (longer if the cleaning cartridge has been used often).
   - The robot automatically picks the cartridge from the tape drive and replaces it in the fixed cartridge slot.

6. Confirm that the cleaning was done by looking at the LED on the front of the tape drive. The Use Cleaning Tape LED should be off. If the LED is still on, the cleaning cartridge may need to be replaced. Obtain a new cleaning cartridge and clean the tape drive again.

   Note: If the Use Cleaning Tape LED is still on after the second cleaning, there may be a problem with the tape drive. Contact your service provider.

7. When the cleaning is complete, return the library to SCSI mode and re-enable security, if appropriate.

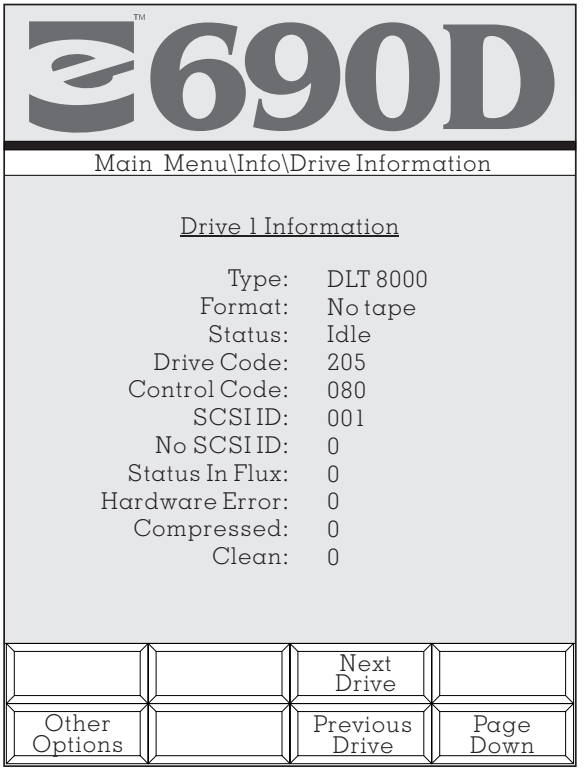
Viewing tape drive information

The Tape Drive Information Menu allows you to view information about the tape drive, including the type of tape drive installed and its operational status. The tape drive information screen is updated whenever there is a change in drive status.

To view tape drive information:

1. From the Main Menu, select Information Menu.

2. From the Information Menu, select Tape Drive Information Menu. The following screen appears:



3. Press the Page Down softkey to display additional tape drive information.

4. Press Next Drive or Previous Drive to display information about the next or previous tape drive.

The following table describes the information on the Tape Drive Information screen.

Tape Drive Information screen	
Type	The type of tape drive installed.
Format	Tape Format. The formats are: ▪ No Tape ▪ Unknown (unknown format) ▪ Cleaning ▪ TK50 (RO) ▪ TK70 (RO) ▪ III/2.6 GB (2.6 GB on CompacTape III media) ▪ III/6.0 GB (6.0 GB on CompacTape III media) ▪ III/10 GB (10/20 GB on CompacTape III media) ▪ IIIXT/15 GB (15/30 GB on CompacTape IIIXT media) ▪ IV/20 GB (20/40 GB on CompacTape IV media) ▪ IV/35 GB (35/70 GB on CompacTape IV media) ▪ IV/40 GB (40/80 GB on CompacTape IV media)

Tape Drive Information screen *(continued)*	
Status	Tape Motion Status. One of the following: ▪ Idle ▪ Rewind ▪ Seeking ▪ Reading ▪ Writing ▪ Erasing ▪ Cleaning ▪ Loading ▪ Unload ▪ Rdy4Code (Ready for code) ▪ CodeUIP (Code upgrade in progress) ▪ Calib (Calibrating)
Drive Code	Drive Microcode Revision. The tape drive's microcode revision.
Control Code	Controller Microcode Revision. The tape drive's controller microcode revision.
SCSI ID	The SCSI ID of the tape drive.
No SCSI ID	0 – The tape drive has a valid SCSI ID set by the library. 1 – The tape drive does not have a valid SCSI ID set by the library. The library must set the tape drive's SCSI ID before the drive is able to communicate on the SCSI bus.
Status in Flux	0 – The status values are valid. 1 – The tape drive can not ensure that the status values are valid.
Hardware Error	0 – The tape drive is not experiencing a hardware error. 1 – The tape drive is experiencing a hardware error.
Compressed	0 – The data being written is not compressed. 1 – The data is compressed.

Tape Drive Information screen *(continued)*	
Clean	0 – The tape drive is clean. 1 – The tape drive needs to be cleaned.
Write Protected	0 – The data cartridge is not write-protected. 1 – The data cartridge is write-protected.
Operate Handle	0 – Do not open or close the handle. 1 – It is okay to open or close the handle.
Drive Door Open	0 – The tape drive door is closed. (The tape drive handle is closed.) 1 – The tape drive door is open. (The tape drive handle is open.)
Present	0 – A tape drive is not installed. 1 – A tape drive is installed.
Occupied	0 – There is no cartridge loaded in the tape drive. 1 – There is currently a cartridge in the tape drive.
Occupied Valid	0 – The library door has been opened or some other interruption has occurred so the occupied information may not be reliable. 1 – The occupied information is reliable.
Accessible	0 – The tape drive is not accessible to the robot because a cartridge is loaded in the tape drive or the tape drive's status is unknown. 1 – The tape drive is accessible to the robot because an unloaded cartridge is in the tape drive or the drive is empty.

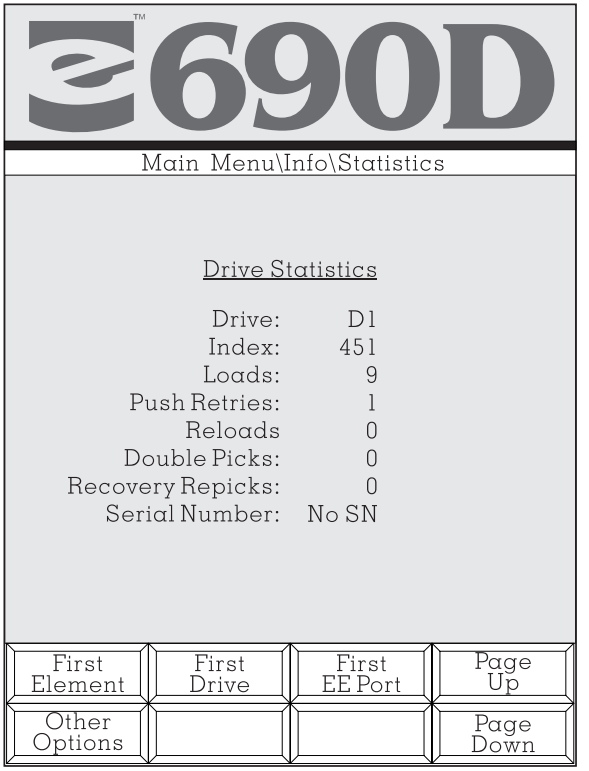
Viewing tape drive statistics

The Drive Statistics screen allows you to view data about robot moves to tape drives. Tape drive statistics are updated whenever there is a change in drive status.

To view tape drive statistics:

1. From the Information Menu, select Statistics, then Element Statistics.

2. From the Element Statistics screen, press First Drive. The statistics for the first drive appears:



3. To view statistics for the next drive, press Page Down.

4. Continue pressing Page Down until you have viewed statistics for all of the tape drives.

The following table describes the information in the Drive Statistics screen.

Drive Statistics	
Field name	**Description**
Drive	The drive number.
Index	The element index.
Loads	The number of times the robot loaded a cartridge into the tape drive.
Push Retries	The number of times the robot retried pushing a cartridge into the tape drive because the robot did not reach the correct position on the reach axis.
Reloads	The number of times the robot reloaded a cartridge into the tape drive.
Double Picks	The number of times the robot had to grab a cartridge twice to remove it from the tape drive. A double pick results when the cartridge is not ejected far enough for the robot to grasp.
Recovery Repicks	The number of times the robot had to reload a cartridge before removing it from the tape drive.
Serial Number	The serial number of the tape drive.

7 Routine Service

This chapter describes how to:

- Perform general cleaning tasks for the library
- Touch-up paint on the housing
- Replace the fuse
- Replace the air filter
- Replace a power supply
- Replace a tape drive

CAUTION

Unless you have a self-maintenance contract with Exabyte, do not attempt to replace any components in the library other than the fuse, air filter, power supply, or tape drives. If you do so, you will void your warranty.

Cleaning the library

The only library components that should be cleaned are the tape drives and the library window. Instructions for cleaning the tape drives are provided on page 102.

CAUTION

The library's internal components are lubricated at the factory and should not be cleaned or relubricated.

To protect the internal components from dust, keep the library door closed and locked.

To clean the library's window, use the cleaning packet provided with the library. To order additional cleaning packets, contact Exabyte (see the inside back cover).

CAUTION

To avoid scratching the window, do not use abrasive cleaners, abrasive cleaning implements, harsh chemicals, or solvents.

Using touch-up paint on the housing

For standalone models, a pearl-white paint kit is available for touching up nicks and scratches on the finish. For ordering information, contact Exabyte (see the inside back cover).

Replacing the fuse

The library uses a 6.3 amp, 250-volt fuse, which is located in the fuse drawer at the back of the library to the left of the power cord connector. An extra fuse is provided in the fuse drawer. To order additional fuses, contact Exabyte (see the inside back cover).

CAUTION

When replacing the library's fuse, use only the same type and rating of fuse.

To replace the fuse:

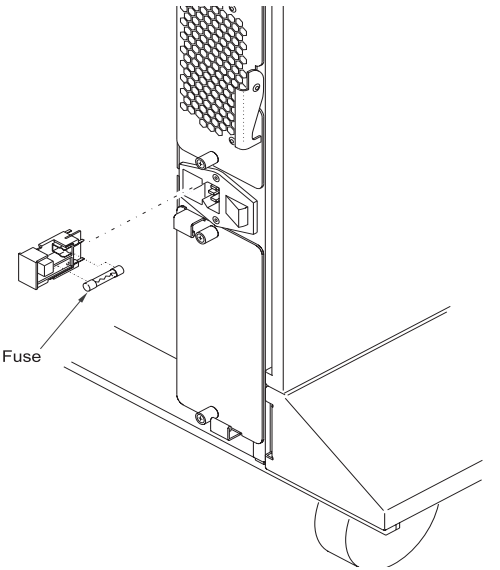
1. Turn off the library and remove the power cord.

WARNING!

Before performing this installation or maintenance procedure, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

2. Place a small screwdriver to the right of the tab on the fuse drawer. Gently pull out the fuse drawer.

3. Pull the blown fuse out of the fuse slot, as shown in the figure below.



4. Remove the spare fuse and place it in the fuse slot.

5. Insert the fuse drawer into the back panel. Push in until you hear it snap into place.

6. Connect the power cord and power on the library.

7. Order another 6.3 amp spare fuse for the fuse drawer.

Replacing the air filter

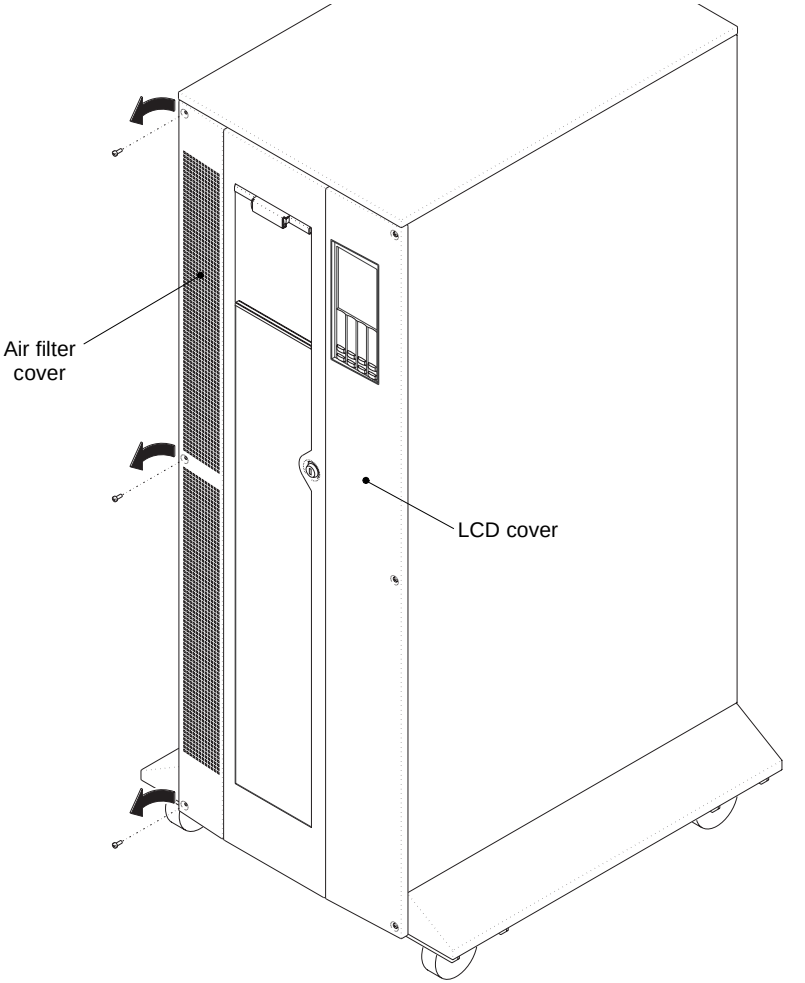
The library includes an air filter, located behind the air filter cover. The air filter should be replaced once a year (or more frequently if the library is operating in a dirty environment). To order replacement filters, contact Exabyte (see the inside back cover).

➤ **Important** Air filters protect the library from large contaminants, but are not intended to keep the tape drives clean. You must still clean the tape drives as described on page 102.

To replace the air filter:

1. Use a Phillips screwdriver to remove the three screws that secure the air filter cover to the outside of the library.

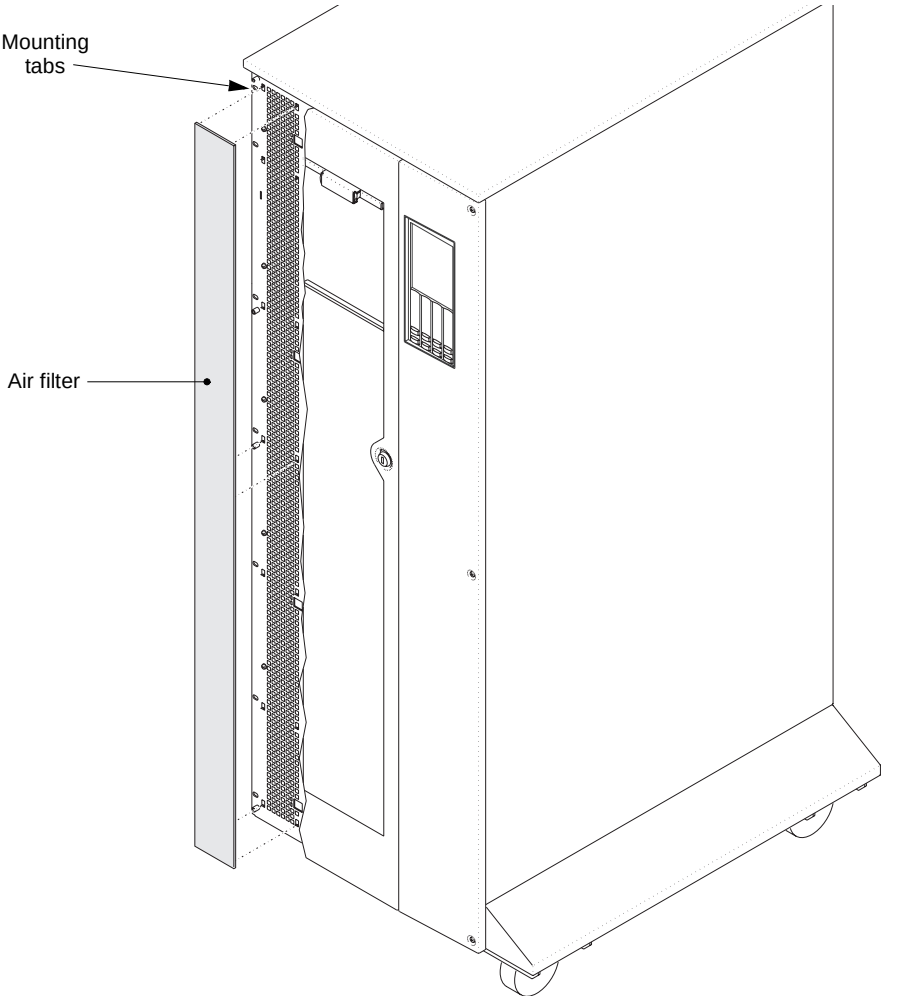
2. Pull on the outside edge of the air filter cover and rotate it slightly so that the four metal tabs release from the inside edge of the panel (closest to the library door).



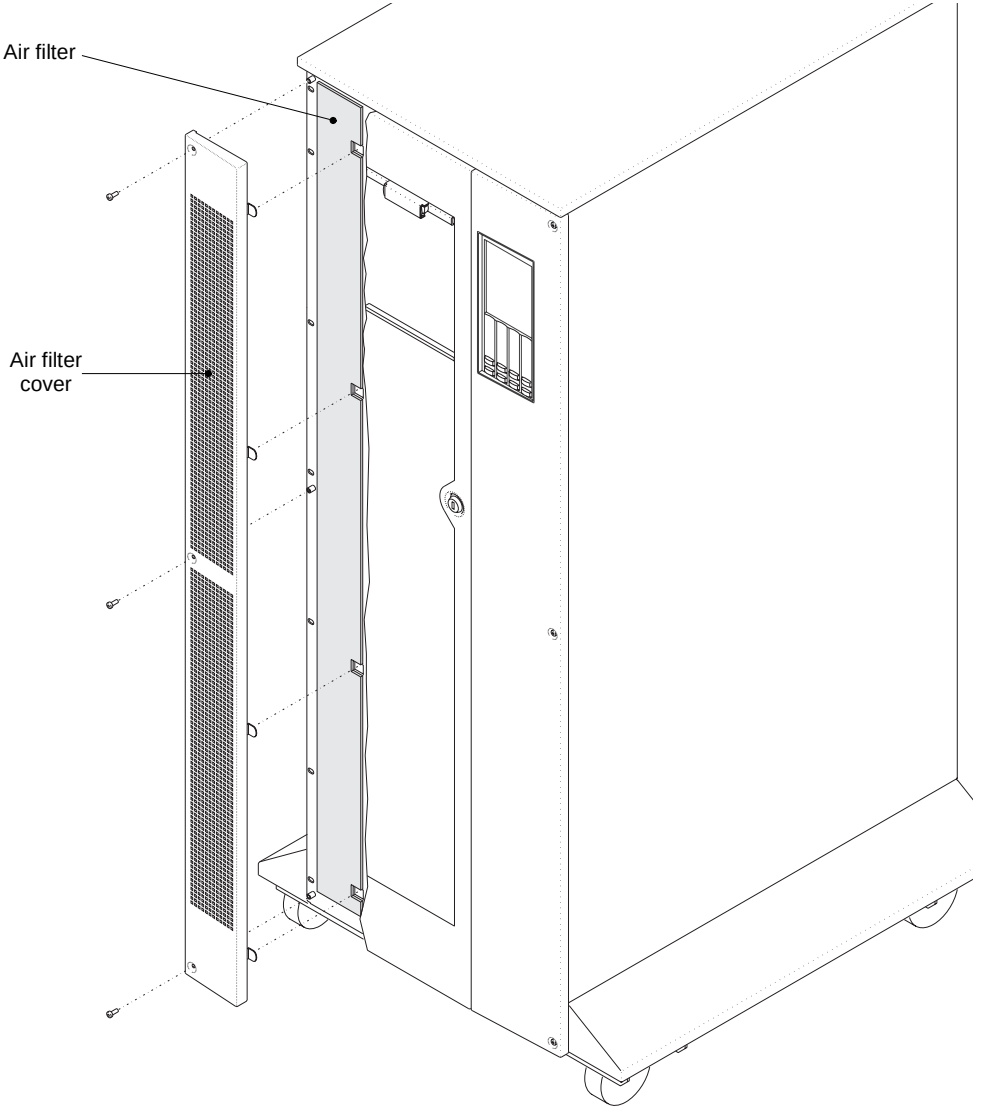
3. Remove the air filter cover.

4. Pull out the old air filter.

5. Place the new air filter against the metal chassis. Make sure to push the mesh over the mounting tabs located on the chassis, as shown in the following figure.



6. Place the air filter cover in front of the library so that the metal tabs on the inside edge of the panel line up with the slots next to the library door.



7. Insert the metal tabs into the slots and push the panel into place so that it fits snugly against the front of the library.

   Note: Make sure the screw holes in the air filter cover line up with the screw holes in the chassis stand-offs.

8. Replace the three screws on the air filter cover.

Replacing a power supply

This section describes how to replace a failed power supply. You can order a power supply kit from Exabyte. See the inside back cover for contact information.

Required tools and equipment

Make sure you have the following:

- New power supply (included with the power supply kit)
- # 2 Phillips screwdriver (not included with power supply kit)

Protect from ESD

Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband during installation. If a wristband is not available, touch a known grounded surface, such as the computer's metal chassis.

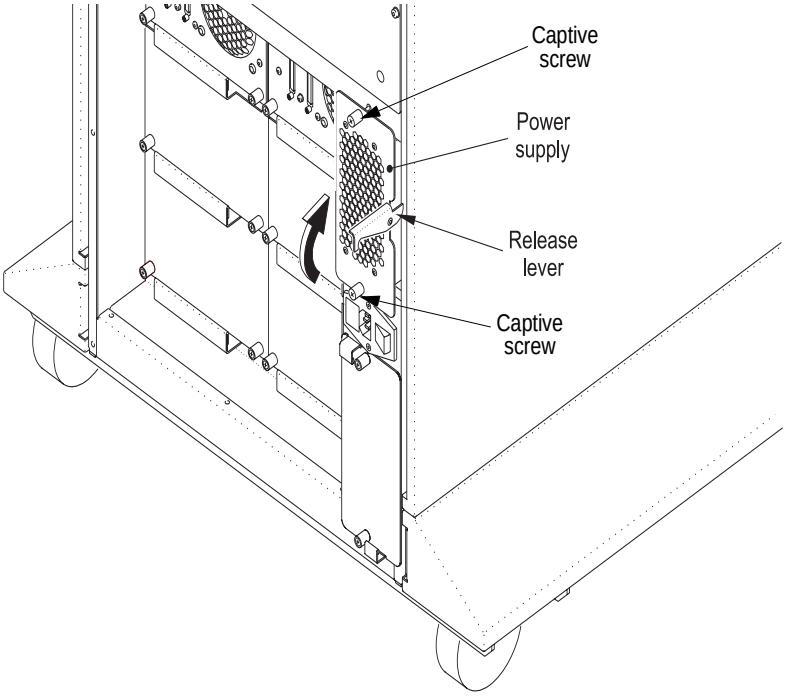
Step 1 – Remove the old power supply

Note: If you are replacing a power supply and do not have a second power supply installed, you must turn the library's power off.

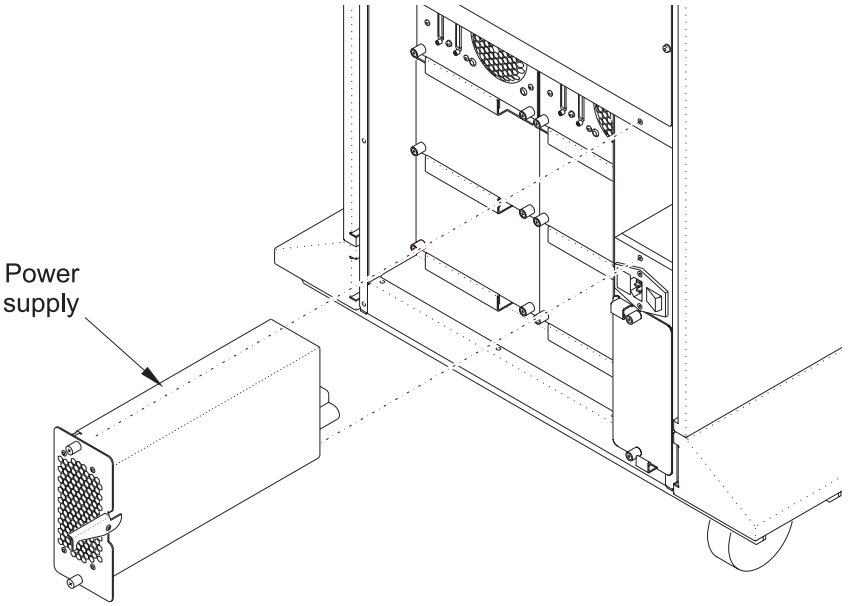
To remove the old power supply:

1. From the back of the library, use a # 2 Phillips screwdriver to release the two captive screws on the power supply you want to remove.

2. To completely disengage the power supply from the library, pull the release lever up until it forms a right angle with the back of the library, as shown below.



3. Pull the power supply straight out of the library.



Step 2 – Install the new power supply

To install the new power supply:

1. Orient the new power supply so that the release lever is on the right and slide it into the opening in the back of the library. The power supply should slide in easily. If there is any resistance, adjust the position of the power supply and try again. Do not force it in.

2. Once the power supply is correctly seated, push the release lever toward the library until it is parallel with the back of the library.

> **CAUTION**
>
> If you pull out the power supply after initially seating it, wait at least 60 seconds before reinserting the power supply into the library. If you reinsert the power supply in less than 60 seconds, you will need to reset or power cycle the library for the power supply to operate.

3. Using a # 2 Phillips screwdriver, tighten the two captive screws to 8.0 inch-pounds (9.2 kg-cm) of torque.

Replacing a tape drive

When you order a new tape drive for the library, you must order it through Exabyte or an approved Exabyte supplier. The replacement drive must be specially equipped for library operation and must include an Exabyte drive carrier.

Replacing a tape drive involves the following steps:

✔	Step	Description
	1	If you are replacing a tape drive and the drive contains a data cartridge, remove the cartridge.
	2	Power off the library and disconnect the tape drive.
	3	Remove the old tape drive.
	4	Install the new tape drive carrier.
	5	Connect the tape drive to the SCSI bus.
	6	Power on the library.

Required tools and equipment

Make sure you have the following:

- New tape drive (included with the tape drive kit)
- # 2 Phillips screwdriver (not included with tape drive kit)

➤ **Important** You cannot install a generic Quantum® DLT™ tape drive into the library. The tape drive you install must be equipped with an Exabyte drive carrier.

CAUTION

Do not mix DLT 7000, DLT 8000 HVD, or DLT 8000 LVD tape drives in the library. Make sure all tape drives are the same type and model.

Protect from ESD

Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband during installation. If a wristband is not available, touch a known grounded surface, such as the library's metal chassis.

Step 1 – Unload a cartridge from the tape drive

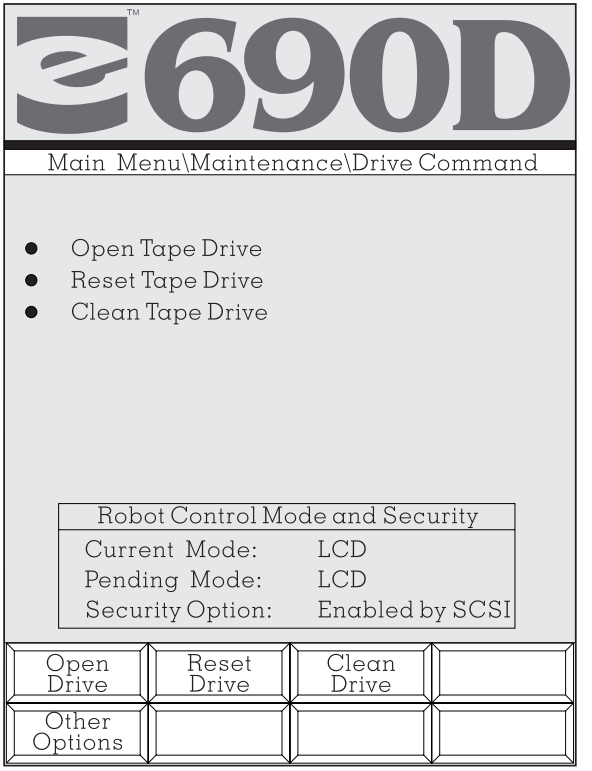
If the tape drive contains a cartridge, you must unload the cartridge as described in this section.

> **CAUTION**
>
> Do not open the library door and attempt to unload the tape drive using the Unload button on the faceplate of the tape drive. Pressing the Unload button *does not* eject the cartridge — the tape drive handle is still "closed."
>
> Do not attempt to open the tape drive manually by turning the handle. Manually turning the handle to open or close the tape drive can damage the tape drive and may cause injury.

To unload the tape drive using the operator panel:

1. If necessary, disable security (see page 63).
2. Change the control mode to LCD (see page 85).

3. From the Maintenance Menu (in the Main Menu), select the Tape Drive Command Menu. The following screen appears:



4. Press Open Drive.

5. To open Tape Drive 1, press Start. To open another tape drive, press the following softkeys:

   Set Dest
   +1 (until you reach the tape drive that you want to open)
   Save
   Start

   When you do so, the tape drive unloads the tape. After the tape is unloaded (the Operate Handle LED will blink), the robot opens the tape drive handle.

6. From Maintenance Menu (in the Main Menu), select the Library Command Menu. Press the Move Cart softkey to remove the cartridge from the tape drive and place it in a slot.

Step 2 – Disconnect the library and tape drive

1. Turn the library's power switch to off.

2. Disconnect the power cord.

> **WARNING!**
>
> Before performing this installation or maintenance procedure, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

3. Disconnect any SCSI cables from the back of the tape drive.

Step 3 – Remove the old tape drive

1. From the back panel, use a # 2 Phillips screwdriver to release the two captive screws that secure the tape drive carrier to the library.

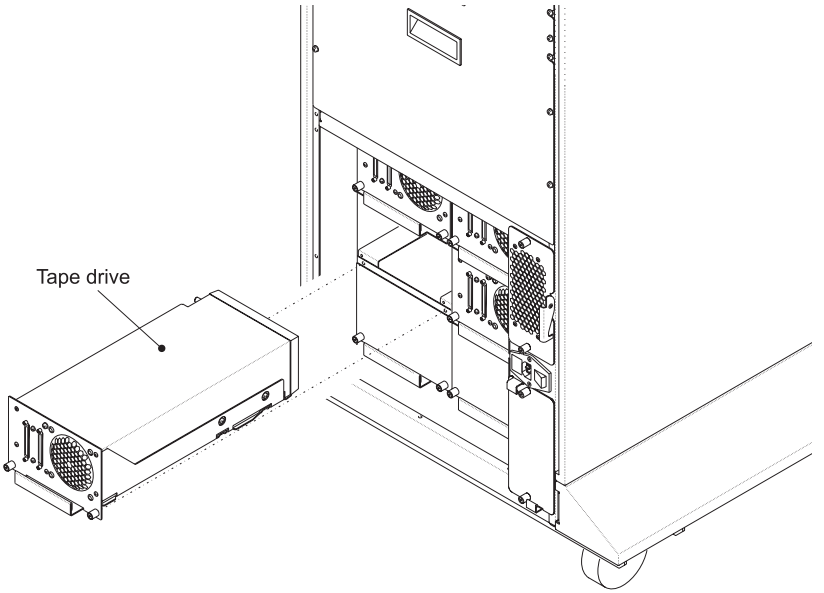
2. Remove the tape drive by pulling the drive carrier straight out of the library, as shown on See the inside back coverpage 129. The drive carrier weighs 10 pounds (4.54 kg); make sure you support the bottom of the carrier as you remove it.

WARNING!

Do not power on the library with a drive slot open. You must install a tape drive or service access cover in the open drive slot before powering on the library.

Step 4 – Install the new tape drive

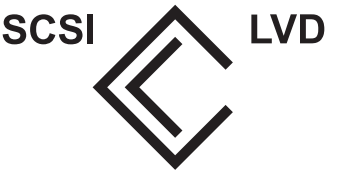
1. Insert the tape drive carrier into the drive slot, as shown in the following figure. The drive should slide easily toward the front of the library.



2. Make sure the symbol on the new drive (HVD or LVD) matches the symbols on the already installed drives (HVD or LVD).

   The SCSI symbols that distinguish between high-voltage differential (HVD) and low-voltage differential (LVD) are shown in the following figure.

High-voltage differential (HVD)



Low-voltage differential (LVD)

3. When the tape drive carrier is almost completely inside the slot in the library, you will feel some resistance. This is caused by the connection between the tape drive and the library's drive interface card. **To seat the connection, push firmly against the drive until you can push no further.**

4. Using a # 2 Phillips screwdriver, attach the two captive screws so that the drive carrier is secured to the library. Tighten the screws to 8.0 inch-pounds (9.2 kg-cm) of torque.

Step 5 – Connect the tape drive to the SCSI bus

1. Decide which SCSI bus you want to use for the tape drive.

> **CAUTION**
>
> To avoid damaging the tape drive, make sure the library is powered off when you connect it to the SCSI bus.

2. If your are unfamiliar with connecting devices on a SCSI bus, especially issues concerning HVD and LVD configuration, read Appendix B.

3. Using wide SCSI cables and the connectors on the back of the tape drive, connect the drive to the SCSI bus.

➤ **Important** When you attach the SCSI cables to the SCSI connectors, make sure you tighten the SCSI cable jack screws to no more than 2.0 inch-pounds (2.3 kg-cm) of torque.

Step 6 – Power on the library

1. Reconnect the power cord.

2. Turn on the library. The library will take several minutes to calibrate the new drive and complete its power-on self-test.

Note: When you replace a tape drive, the new drive automatically assumes the SCSI ID of the old tape drive. If you want to view or change the SCSI ID of the new tape drive, see page 56.

8 Library Upgrades

You can upgrade the 690D library to include additional hardware.

This chapter describes how to:

- Install additional cartridge slots
- Install an additional tape drive
- Install an additional power supply
- Upgrade the library to include Fibre Channel

Installing additional cartridge slots

If your library was shipped with 6 or 12 data cartridge magazines (30 or 60 cartridge slots), you can install additional slots with an upgrade kit available from Exabyte (see the inside back cover). Each kit increases the library's capacity by 30 slots.

Installing additional cartridge slots involves the following steps:

✔	Step	Description
	1	Remove the magazines from the library.
	2	Install new mounting plates on the drum.
	3	Attach reflective plates to the mounting plates.
	4	Renumber the mounting plate labels.
	5	Replace the magazines in the library.
	6	Power on the library.
	7	Configure the library for new hardware.
	8	If necessary, configure the library for the software application.

Before you begin

Once you have received the upgrade kit from Exabyte, follow the procedures in this section before you begin installing the additional slots.

Obtain equipment

Make sure the upgrade kit from Exabyte contains the following equipment:

- Six mounting plates with white reflective plates attached
- Twelve 8-32 × 0.5 panhead screws
- Six Exabyte DLTtape™ Data Cartridge Magazines
- One set of mounting plate labels
- One set of cartridge slot and magazine labels

Obtain the following tools:

- Small flat-blade screwdriver
- T-20 TORX bit and TORX driver

Protect from ESD

Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband during installation. If a wristband is not available, touch a known grounded surface.

Power off the library

1. Turn the library's power switch to off.

2. Disconnect the power cord.

WARNING!

Before performing this installation or maintenance procedure, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

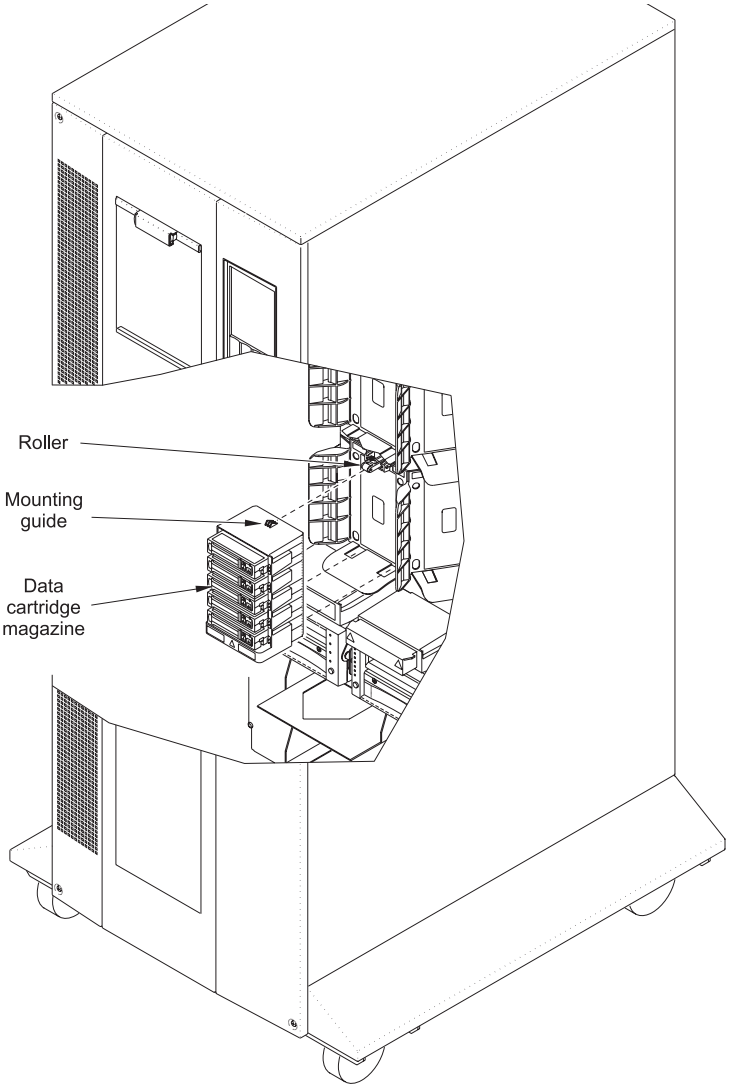
Step 1 – Remove the magazines from the library

To easily access the drum and the mounting plates, remove all of the magazines by following these steps:

1. Unlock and open the front door of the library.

2. Make sure the robot and its cabling are safely out of the way of the magazines. If necessary, move the robot to the bottom of the vertical axis by pushing firmly against its base.

3. Remove each magazine by pulling it out first from the top, then the bottom. (You can access back magazines by rotating the drum manually.)

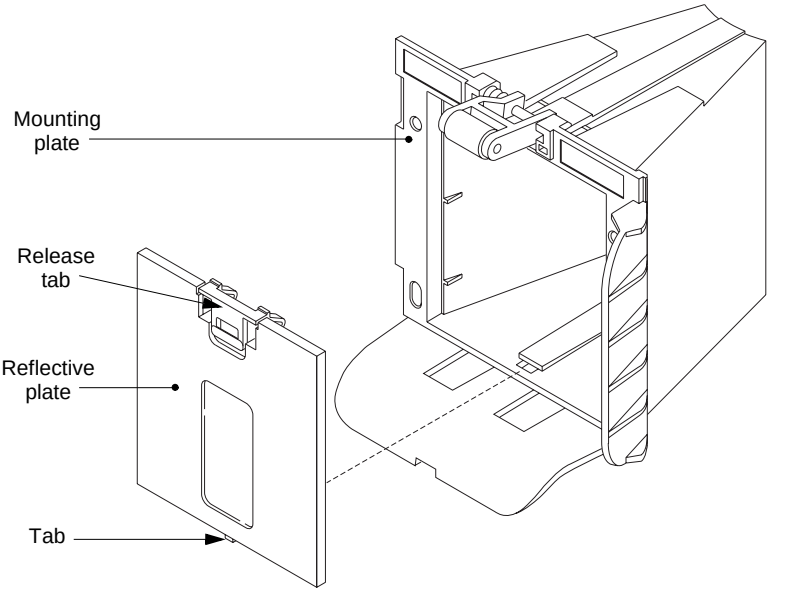


Step 2 – Install new mounting plates on the drum

To access the new mounting plates for installation on the drum spindle, you must first remove the reflective plates by following these steps:

1. Locate the six mounting plates (with reflective plates attached) from the upgrade kit.

2. Using a small flat-blade screwdriver, press the release tab at the top of the first reflective plate.

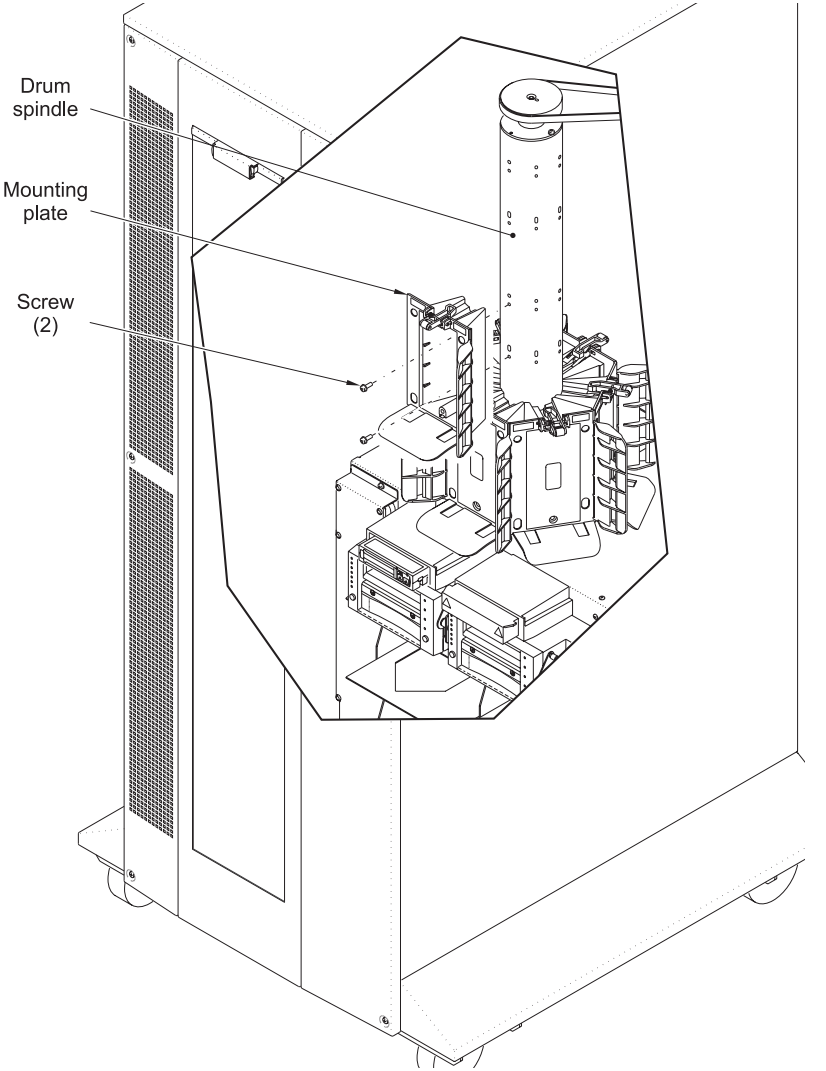


3. Pull the reflective plate out and up to disengage the tab from at the bottom of the reflective plate.

4. Repeat steps 1 through 3 until you have removed all of the reflective plates from the mounting plates in the upgrade kit.

To install the new mounting plates on the drum, follow these steps:

1. Position the magazine mounting plate above the row of mounting plates already installed on the drum, as shown in the following figure.



2. Place the mounting plate against the drum spindle, and line up the screw holes on the plate with the screw holes on the drum.

3. Using a T-20 TORX bit, attach the two 8-32 × 0.5 panhead screws to secure the magazine mounting plate to the drum. Tighten the screws to 15.0 inch-pounds (17.2 kg-cm) of torque.

4. Attach the next mounting plate at the same horizontal level on the drum spindle.

5. Repeat steps 1 to 4 for the remaining mounting plates.

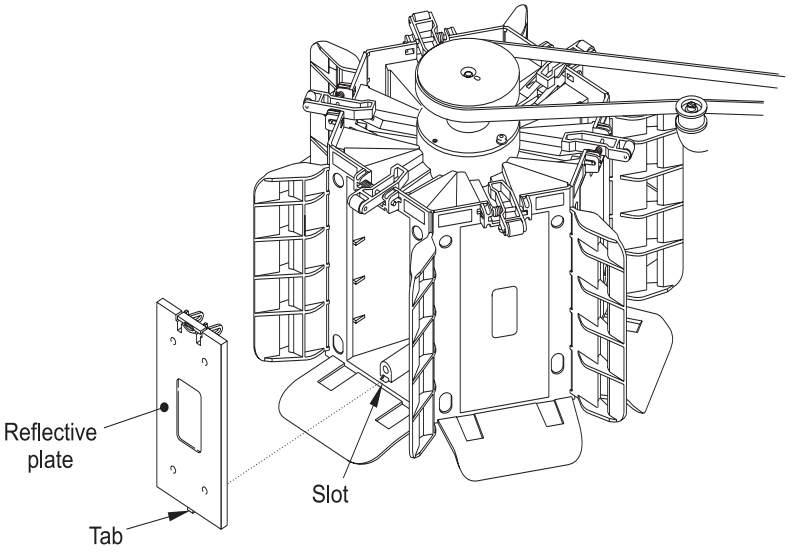
Step 3 – Attach reflective plates to the mounting plates

Re-attach the reflective plates to the new mounting plates by following these steps for each plate:

1. Position the reflective plate in front of the mounting plate, as shown in the figure.

2. Insert the bottom end of the reflective plate first so that the tab is positioned in the mounting plate slot, then snap the plate into place by pressing against the top.

3. Repeat steps 1 and 2 until you have attached all of the reflective plates.



Step 4 – Renumber the mounting plate labels

When you install a new row of magazines, the library's storage capacity is increased by 30 slots. This increase changes the numbering scheme for the following elements in the library:

- Magazine mounting plates
- Magazines
- Cartridge slots

As explained in the following sections, you must renumber the reflective plate labels and the magazine and cartridge slot labels.

Attach new reflective plate labels

You can renumber the reflective plate labels by attaching new numbered labels to all of the reflective plates. This section describes how to attach the new reflective plate labels.

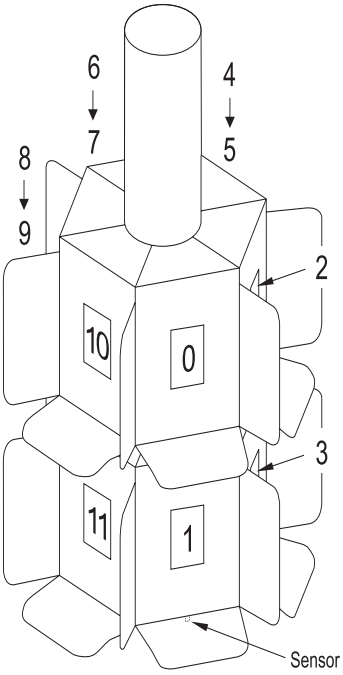
CAUTION

When renumbering the labels, do not move the lower tier of mounting plates installed on the drum. Doing so may cause the drum to lose its home position. If the drum loses its home position, the library cannot operate.

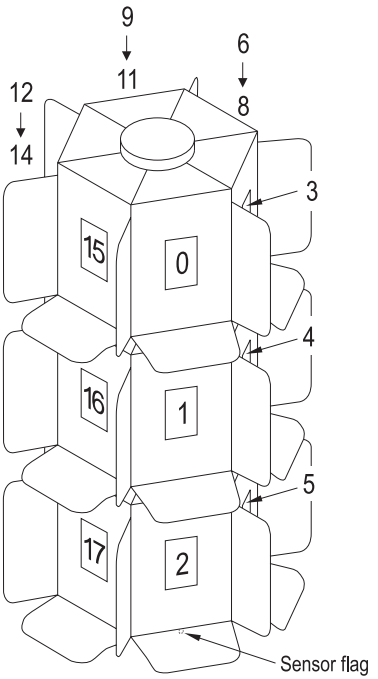
➤ **Important** You must attach the correct labels for your library's numbering scheme. If you do not do this, the element index numbers will not correspond to the label numbers.

The figures below show the numbering scheme for the reflective plate labels in a 60-cartridge library and a 90-cartridge library. The numbering scheme goes from top-to-bottom, left-to-right.

60-Cartridge Library



90-Cartridge Library



Note: Mounting plate 0 is always located in the column of mounting plates above the sensor flag.

To attach new labels to the reflective plates:

1. Rotate the drum until you locate the mounting plate that contains the sensor flag. (The sensor flag protrudes under one of the magazines on the bottom tier.)

2. Using the previous figures as a guide, attach label 0 to the top-most reflective plate above the mounting plate that contains the sensor flag.

3. Continue attaching numbered labels to the reflective plates. Use the appropriate figure (60 or 90-cartridge library on page 143) to make sure you correctly number the plates.

Attach the magazine and cartridge slot labels

After you have renumbered the reflective plates, you can attach magazine and cartridge slot labels to the mounting plates. Each magazine number matches the mounting plate number. For example, magazine 0 is attached to mounting plate 0. Similarly, each cartridge slot number matches its assigned element index number.

The following table shows the magazine label numbers and their corresponding cartridge slot label numbers.

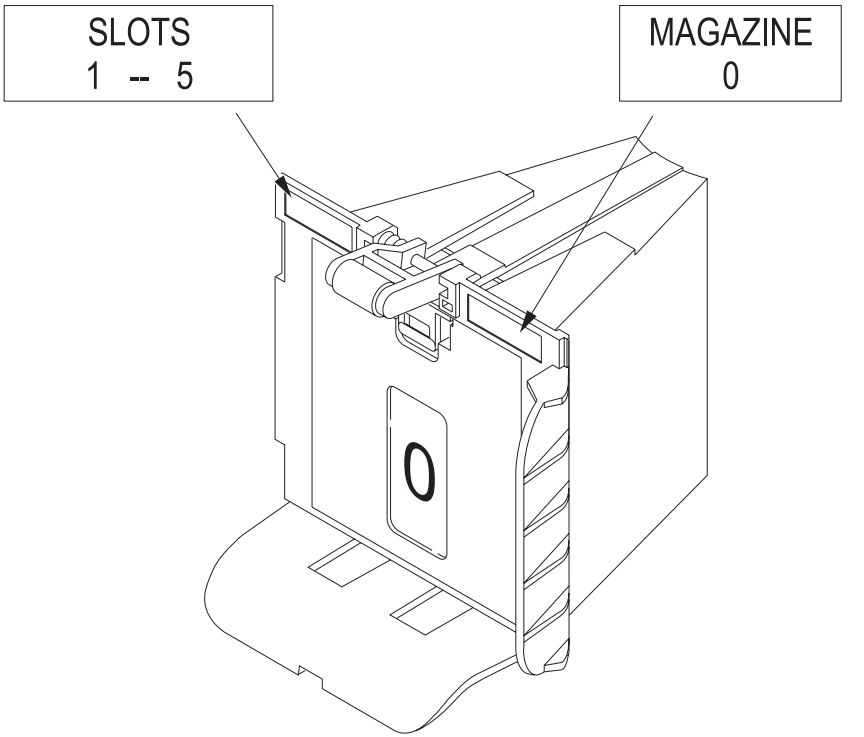
Magazine label	Cartridge slot label
0	1 – 5
1	6 – 10
2	11 – 15
3	16 – 20
4	21 – 25
5	26 – 30
6	31 – 35
7	36 – 40
8	41 – 45
9	46 – 50
10	51 – 55
11	56 – 60
12	61 – 65
13	66 – 70
14	71 – 75
15	76 – 80
16	81 – 85
17	86 – 90

To attach magazine labels and cartridge slot labels to the mounting plates, follow these steps:

1. Manually rotate the drum until mounting plate 0 is facing you.

2. Using the small labels provided in the upgrade kit, attach magazine label 0 to the rectangular indentation on the upper right corner of mounting plate 0, as shown in the following figure.

3. Attach cartridge slot label 1 – 5 to the rectangular indentation on the upper left corner of mounting plate 0.



4. Similarly, attach the appropriate magazine and cartridge slot labels to all of the remaining mounting plates.

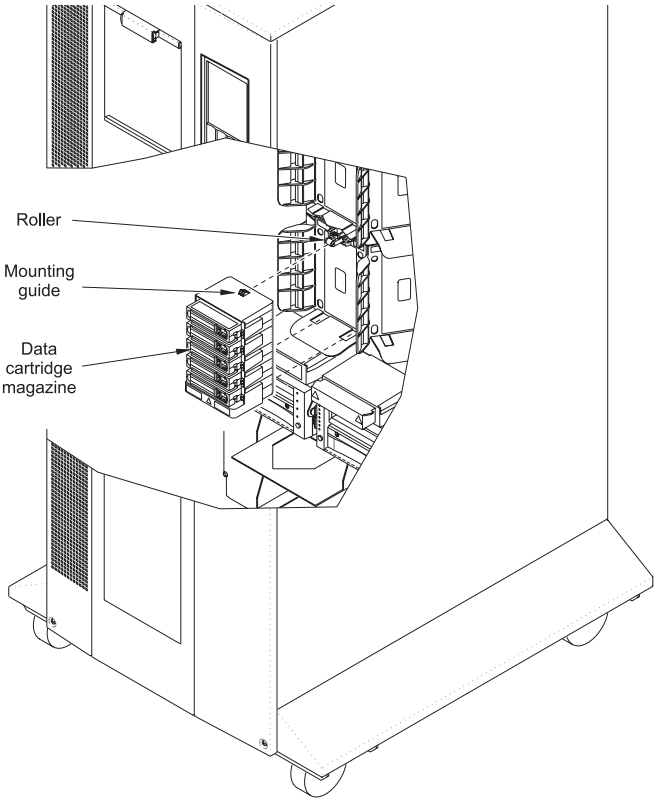
Step 5 – Replace the magazines in the library

After you have attached the magazine and cartridge slot labels, replace the magazines in the library by following these steps:

1. If necessary, manually rotate the drum to access the mounting plate where you want to install the magazine.

2. Locate the roller at the top of the magazine mounting plate.

3. Position the magazine so that the single mounting guide on the magazine is aligned with the roller on the mounting plate, as shown in the figure.



4. Insert the bottom end first, then snap the magazine into place by pressing against the top.

5. Repeat steps 1 to 4 until you have replaced all of the magazines.

Step 6 – Power on the library

1. Reconnect the power cord.

2. Turn on the library. The library will take several minutes to complete its power-on self-test.

Step 7 – Configure the library for new hardware

After installing additional cartridge slots, you must set the Total Installed Slots option, so that the robot can accurately pick and place cartridges in these new slots.

➤ **Important** If you do not set the Total Installed Slots option, the robot cannot access the additional cartridge slots.

Also, if the Total Installed Slots selection does not match the actual number of slots available in the library, the element index numbers will not match the label numbers.

Before setting the Total Installed Slots option

1. If necessary, disable security (see page 63).

2. Change the control mode to LCD (see page 85).

3. Make sure that all of the magazines are installed in the library, including the entry/exit port magazine. (The magazines can be empty or full.)

4. Make sure the fixed slot and tape drives are empty. Use the Open Drive command to unload a cartridge from a tape drive (see page 99).

➤ **Important** For library calibration to complete successfully, all of the magazines must be installed in the library. Also, the fixed slot and all tape drives must be empty.

Setting the Total Installed Slots option

1. From the System Setup Menu (in the Configuration Menu), press the Set # Slots softkey.

2. Depending on how many total slots are now installed, press the 60 Slots softkey or the 90 Slots softkey. For example, if you started with a 60-cartridge library and installed one set of additional slots, you would select the 90 Slots softkey.

3. When you are satisfied with your selection, press Save to reset and calibrate the library for the new number of slots.

   After you press Save, the library undergoes a power-on self-test and calibrates the positions of the cartridge slots and drives. When calibration is complete, the Status screen displays a library ready status.

4. If you removed a cartridge from the fixed slot before calibrating the library, you can replace the cartridge in one of two ways:

   - Insert the cartridge into the entry/exit port and use a Move Cartridge command to place it in the fixed cartridge slot.

   - Open the library door and return the cartridge to the fixed slot. Then, close and lock the library door.

Step 8 – Configure the library for software slots

If you want to change the number of slots recognized by your software application, you can set the Max Addressable Element option. For information about setting this option, see page 68.

Installing an additional tape drive

You can order a tape drive kit from Exabyte. For contact information, see the inside back cover.

Installing a tape drive involves the following steps:

✔	Step	Description
	1	Power off the library.
	2	Remove the drive slot service access cover.
	3	Install the new tape drive carrier. (Your software may require installation in sequential order. See page 153.)
	4	Connect the tape drive to the SCSI bus.
	5	Power on the library.

Required tools and equipment

Make sure you have the following:

- New tape drive (included with the tape drive kit)
- # 2 Phillips screwdriver (not included with tape drive kit)

➤ **Important** You cannot install a generic Quantum® DLT™ tape drive into the library. The tape drive you install must be equipped with an Exabyte drive carrier.

CAUTION

Do not mix DLT 7000, DLT 8000 HVD, or DLT 8000 LVD tape drives in the library. Make sure all tape drives are the same type and model.

Protect from ESD

Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband during installation. If a wristband is not available, touch a known grounded surface, such as the library's metal chassis.

Step 1 – Power off the library

1. Turn the library's power switch to off.

2. Disconnect the power cord.

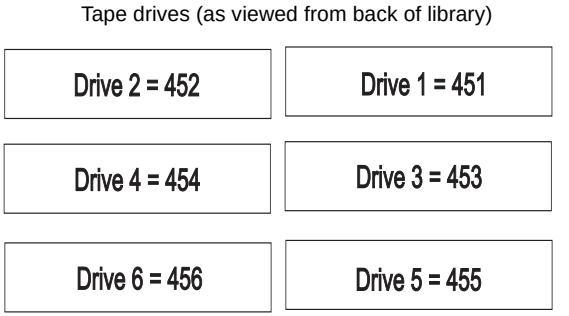
> **WARNING!**
>
> Before performing this installation or maintenance procedure, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

Step 2 – Remove the drive slot service access cover

Your software application may require you to install the tape drive in sequential order, so that the software can recognize the new drive. (Refer to your software documentation for information about element address recognition.)

For example, the first two tape drives in the library occupy slots 451 and 452. If your library contains two tape drives and you want to install a third drive in sequential order, install the drive in slot 453.

The following figure shows the element index numbers assigned to the six tape drives, as viewed from the back of the library. (Refer to pages 165 to 167 for a complete numbering scheme of the library element indexes.)



To remove the service access cover:

1. From the back panel, use a # 2 Phillips screwdriver to release the two captive screws that secure the service access cover to the drive slot where you want to install the new tape drive.

2. Remove the cover so that the drive slot is open. (You can discard the cover.)

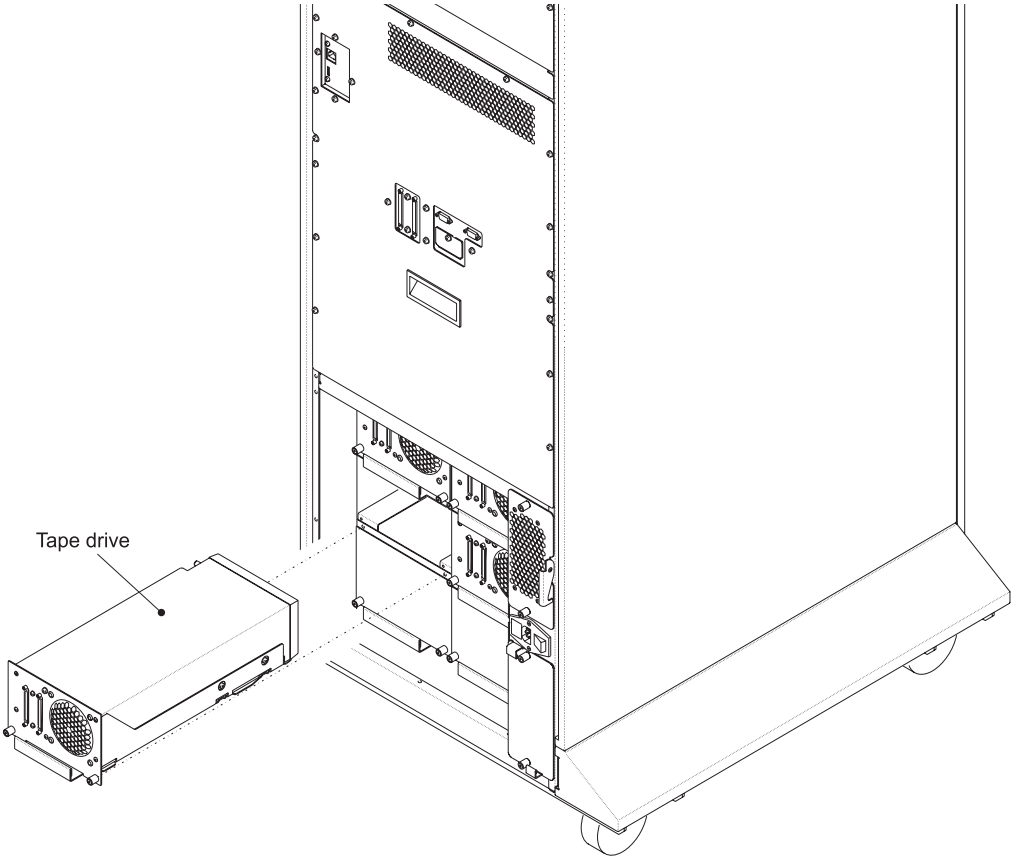
WARNING!

Do not power on the library with a drive slot open. You must install a tape drive in the open slot before powering on the library.

Step 3 – Install the tape drive

To install a tape drive in the library:

1. Insert the tape drive carrier into the drive slot, as shown in the following figure. The drive should slide easily toward the front of the library.



2. Make sure the SCSI symbol on the new drive (HVD or LVD) matches the SCSI symbol on the drive that is already installed (HVD or LVD).

   The SCSI symbols that distinguish between high-voltage differential (HVD) and low-voltage differential (LVD) are shown in the following figure.

High-voltage differential (HVD) Low-voltage differential (LVD)

3. When the tape drive carrier is almost completely inside the slot in the library, you will feel some resistance. This is caused by the connection between the tape drive and the library's drive interface card. **To seat the connection, push firmly against the drive until you can push no further.**

4. Using a # 2 Phillips screwdriver, attach the two captive screws so that the drive carrier is secured to the library. Tighten the screws to 8.0 inch-pounds (9.2 kg-cm) of torque.

Step 4 – Connect the tape drive to the SCSI bus

1. Decide which SCSI bus you want to use for the tape drive.

Note: When you install a new tape drive, a default SCSI ID is assigned in sequence with the library and other drives. To change the SCSI ID after you power on the library, see page 56.

2. If you are unfamiliar with connecting devices on a SCSI bus, especially issues concerning HVD and LVD configuration, read Appendix B.

3. Using wide SCSI cables and the connectors on the back of the tape drive, connect the drive to the SCSI bus.

> **CAUTION**
>
> To avoid damaging the tape drive, make sure the library is powered off when you connect it to the SCSI bus.

➤ **Important** When you attach the SCSI cables to the SCSI connectors, make sure you tighten the SCSI cable jack screws to no more than 2.0 inch-pounds (2.3 kg-cm) of torque.

Step 5 – Power on the library

1. Reconnect the power cord.

2. Turn on the library. The library will take several minutes to calibrate the new drive and complete its power-on self-test.

Installing a second power supply

This section describes how to install a second power supply, available from Exabyte (see the inside back cover). Installing an additional power supply ensures that library operations are not interrupted if the first power supply fails.

> ➤ **Important** You do not need to power off the library when you install a second power supply.

Installing a second power supply involves the following steps:

- Removing the blank cover
- Installing the new power supply

Required tools and equipment

Make sure you have the following:

- New power supply (included with the power supply kit)
- # 2 Phillips screwdriver (not included with power supply kit)

Protect from ESD

Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband during installation. If a wristband is not available, touch a known grounded surface, such as the library's metal chassis.

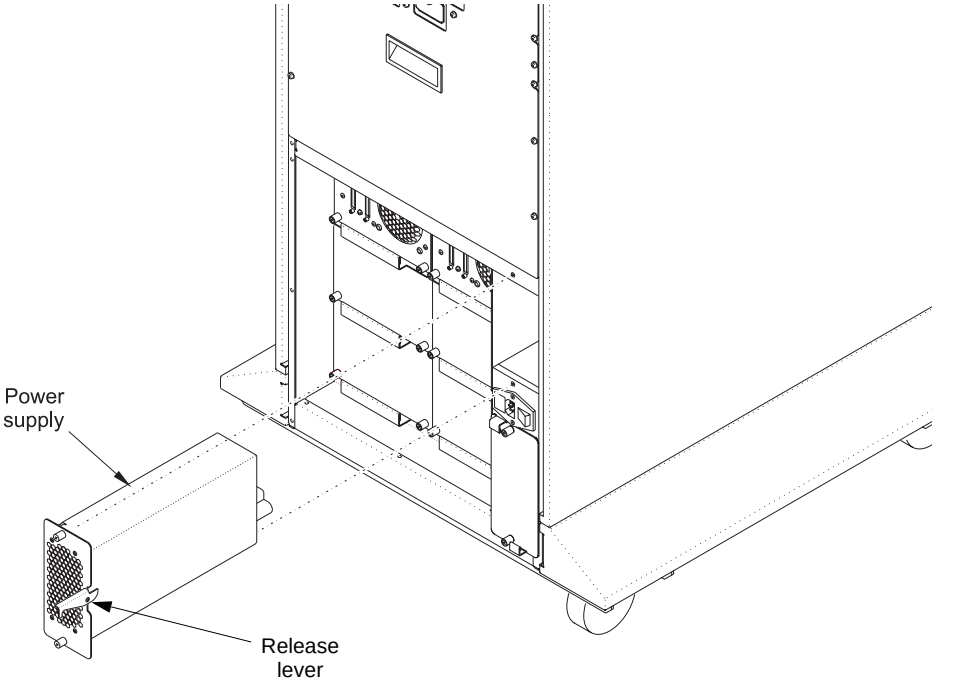
Step 1 – Remove the power supply service access cover

1. From the back of the library, use a # 2 Phillips screwdriver to release the two captive screws on the power supply cover.

2. Remove the cover. (You do not need to keep it for future use.)

Step 2 – Install the new power supply

1. Orient the new power supply so that the release lever is on the right, and slide it into the opening in the back of the library. The power supply should slide in easily. If there is any resistance, adjust the position of the power supply and try again. Do not force it in.



2. Once the power supply is correctly seated, push the release lever down until it is parallel with the back of the library.

> **CAUTION**
>
> If you pull out the power supply after initially seating it, wait at least 60 seconds before reinserting the power supply into the library. If you reinsert the power supply in less than 60 seconds, you will need to reset or power cycle the library for the power supply to operate.

3. Using a # 2 Phillips screwdriver, tighten the two captive screws to 8.0 inch-pounds (9.2 kg-cm) of torque.

Upgrading the library to include Fibre Channel

You can connect your library to a Fibre Channel network using the Exabyte FC12 Fibre Channel to SCSI router.

This procedure includes:

- Installing the router
- Connecting the router to the library
- Connecting the router to the Fibre Channel network

A complete set of instructions is included in the Fibre Channel upgrade kit. For more information, contact your service provider or Exabyte (see the inside back cover).

Notes

9 Hardware Exercises

This chapter describes demos and hardware exercises you can perform from the operator panel by using the Demo Menu, the Library Command Menu, and the Library Diagnostics Menu.

Using elements

Elements are the physical locations in the library that can accept a cartridge (the robot, the magazine slots, the entry/exit port slots, the fixed slot, and the tape drives).

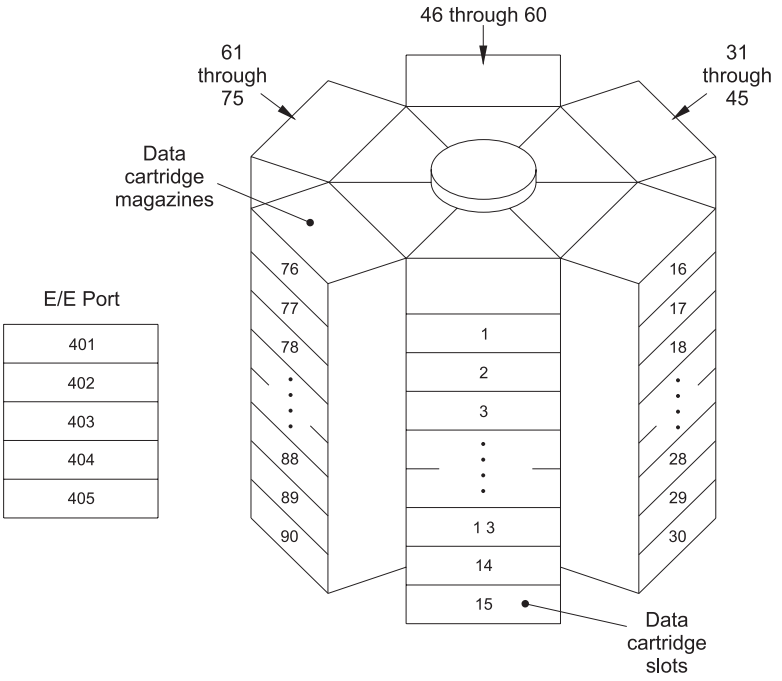
Element indexes

Each element has an *element index*, which enables the library to identify the elements. Many LCD functions require you to use element indexes. For example, to move a cartridge using the Library Command Menu, you must specify the source and destination element indexes. The *source* is either a cartridge slot or the tape drive where the robot will pick a cartridge. The *destination* is either the slot or the tape drive where the robot will place the cartridge.

The position of the element index assignment for the data cartridge slots varies according to the library configuration. For example, if your library contains 90 data cartridge slots, the cartridge slots are assigned element indexes of 1 to 90. The numbers begin at the top cartridge slot on the top tier of magazines attached to the library's drum.

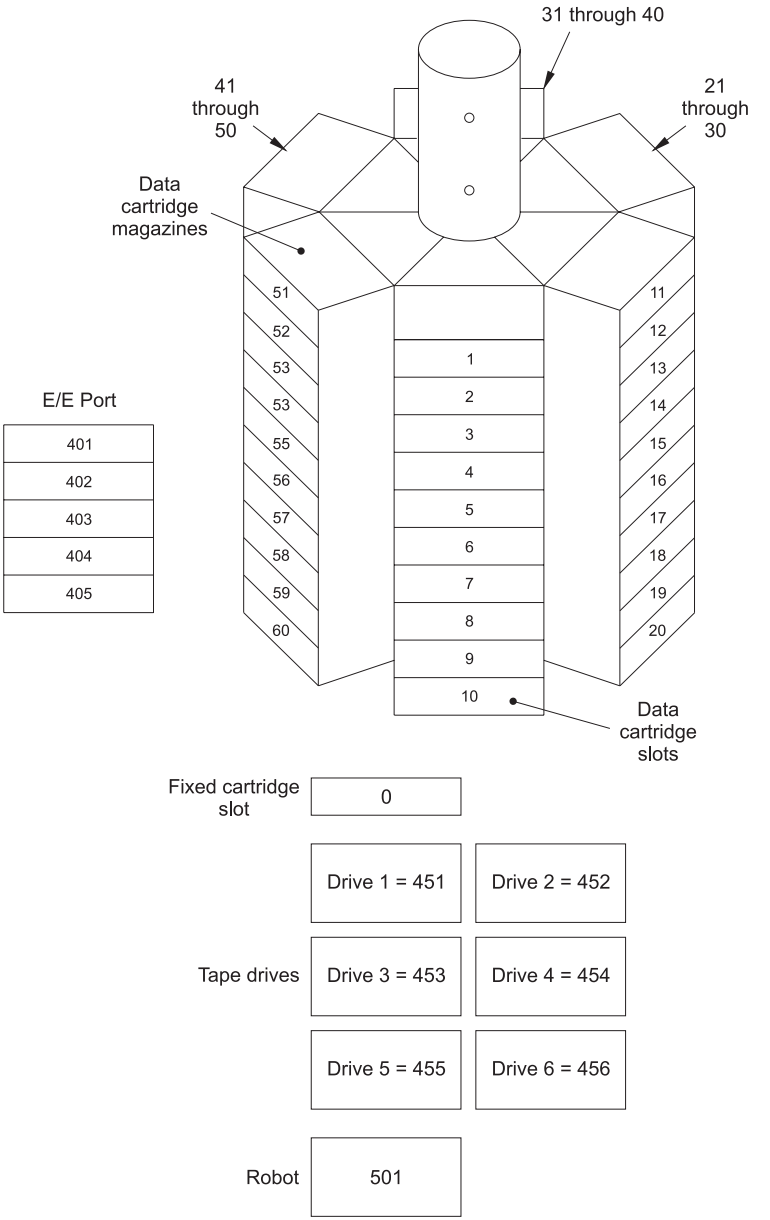
The following figures show element index assignments for a library containing 90 data cartridge slots, 60 data cartridge slots, and 30 data cartridge slots.

Element index assignment: 90-cartridge library

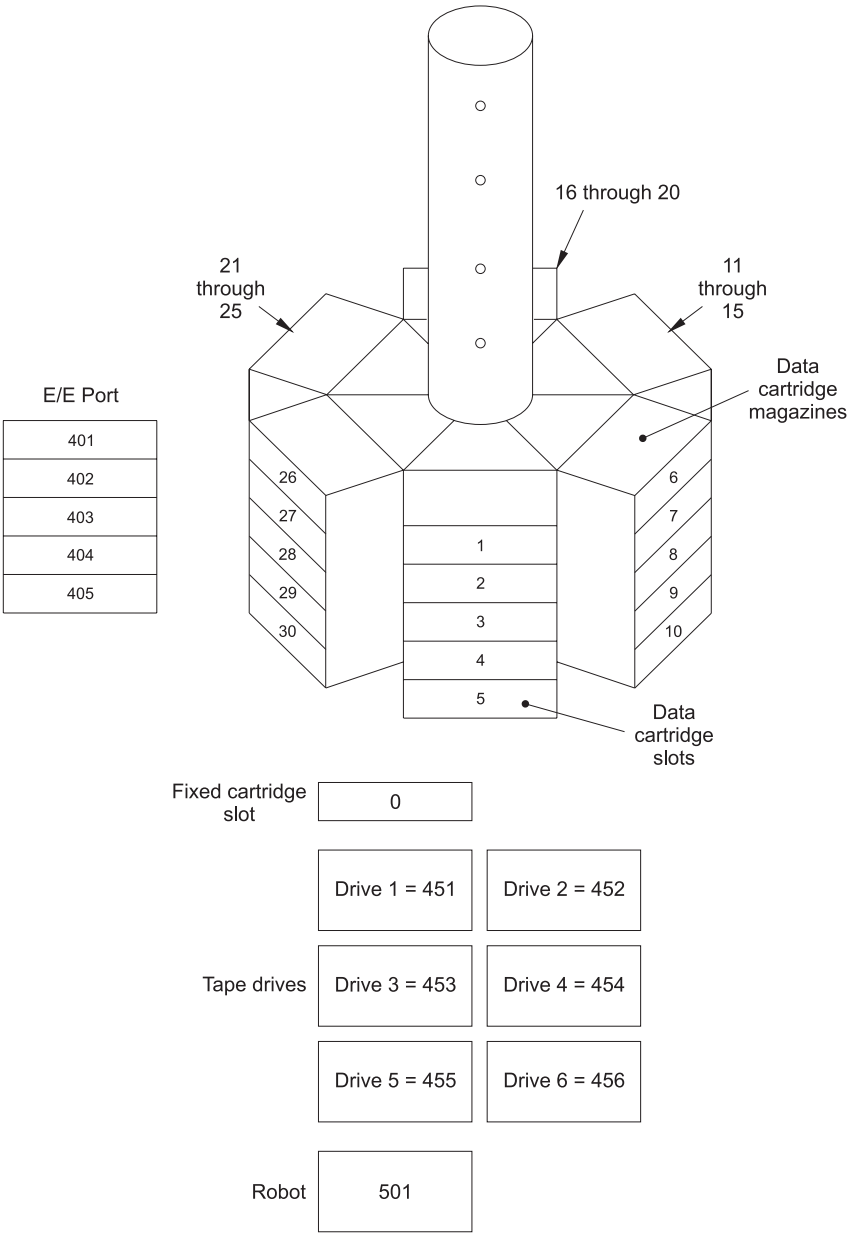


Fixed cartridge slot	0	
Tape drives	Drive 1 = 451	Drive 2 = 452
	Drive 3 = 453	Drive 4 = 454
	Drive 5 = 455	Drive 6 = 456
Robot	501	

Element index assignment: 60-cartridge library



Element index assignment: 30-cartridge library



Element addresses

Your application software may use *element addresses* to identify elements in the library. The difference between an element index and an element address is that an index is a fixed number set by the library, whereas an address can be changed by your application software (using the SCSI command, MODE SELECT).

The element indexes correspond to the library's default element addresses. To verify the current element addresses, display the SCSI Mode Parameters screen (see page 181).

Performing demos and hardware exercises

This section describes how to perform demos and hardware exercises using the Demo Menu and the Library Command Menu. All of these menus are available from the Maintenance Menu on the operator panel.

The Demo Menu provides options for the robot to move cartridges between slots and tape drives. The Library Command Menu provides options for performing specific robot movements.

Using the Demo Menu

The Demo Menu allows you to demonstrate the functions of the robot in the library by moving cartridges between slots and tape drives. You can use the Demo Menu to test the hardware after installation.

To perform a demo, you need to set the following four options:

- **Include Drives**. When the Include Drives option is set to YES, the robot randomly moves cartridges between magazine slots, the fixed slot, and the tape drives. When this option is set to NO, the robot randomly moves cartridges from slot to slot, including the fixed cartridge slot.

- **Scan Labels.** When the Scan Labels option is set to YES, the robot scans bar code labels as part of the demo.

- **Requested Moves.** This option allows you to specify the number of times you want to perform the demo. The default value is 10, but you can request from zero to 1,000,000 moves.

- **Cycle EE Port.** When the Cycle EE Port option is set to YES, movement of the entry/exit port is included in the demo.

Starting a demo option

Before running a demo option:

1. If necessary, disable security (see page 63).

2. Change the control mode to LCD (see page 85).

3. Make sure there is at least one data cartridge present and one empty slot available before you begin the test.

4. From the Maintenance Menu, select Demo Menu. The following screen appears:

To run the demo:

1. Use the softkey options to select the demo parameters (see page 169 for a description of these options).

2. Press Start. The system begins the demo cycles and displays a message telling you when it has completed the total moves requested.

3. Press OK to return to the Demo Menu.

Note: To stop the demo, press Stop. The library displays the total number of cycles that were completed and an Error 91 message, indicating that you have stopped the demo. Press OK to return to the Demo Menu.

Using the Library Command Menu

The Library Command Menu provides basic exercises to test specific library components. You can use these exercises to test the library hardware after installation.

Starting hardware exercises

Before performing hardware exercises from the operator panel, do the following:

1. If necessary, disable security (see page 63).

2. Change the control mode to LCD (see page 85).

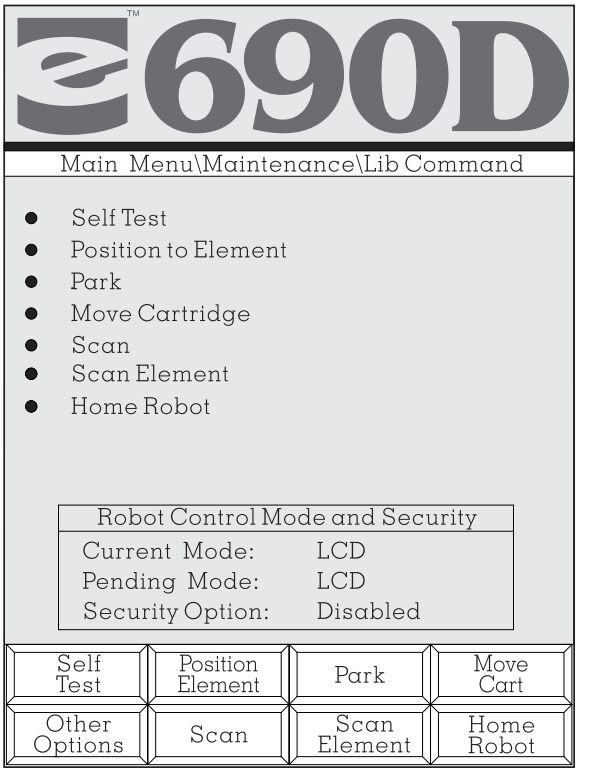
3. Refer to the table below for the element indexes. (You may need these numbers to perform some of the hardware exercises.)

Library component	Element index
Fixed cartridge slot	0 – Cleaning cartridge slot
Data cartridge slots	1 to 30, 1 to 60, or 1 to 90 (See page 165 to 167 for numbering scheme.)
Tape drives	451 to 456 (See page 165 to 167 for numbering scheme.)
Entry/exit port	401 to 405 (See page 165 to 167 for numbering scheme.)

➤ **Important** When performing hardware exercises, do not remove the calibration block from the calibration block slot. If you place the calibration block in a different slot, library operation may be interrupted or terminated.

Performing hardware exercises

1. From the Maintenance Menu, select Library Command Menu. The following screen appears:



2. Press the softkey corresponding to the exercise you want to select, as described in the following table.

3. When the exercise is finished, the screen displays a Status Complete message and the number of errors that occurred during the demo. Press OK to return to the Library Command Menu.

The following table describes each exercise and also provides additional instructions for performing the exercises (if applicable).

Exercise	Description	Additional instructions
Self Test	The robot performs the following exercise: ▪ Performs a Home Robot test ▪ Cycles the reach axis, horizontal axis, and vertical axis once ▪ Cycles the drum axis once ▪ Cycles the entry/exit port once	
Position to Element	The robot moves to a position in front of a tape drive, fixed cartridge slot, or a magazine slot.	When you select Position to Element, a screen appears that asks you to select the element index where you want to position the robot. Select the element index, then press Start.
Park	The robot moves to the park position (bottom left side of the library).	
Move Cartridge	The robot moves a cartridge from one selected location to another. **Important:** Do not insert a cartridge in a tape drive. (The tape drive will not automatically eject the cartridge.) If you do insert a cartridge in a tape drive, use the Open Tape Drive command (see page 99) to remove the cartridge.	When you select Move Cartridge, the Set Command Parameters screen appears. Press Set Source to select the source index (the slot you want the robot to pick from). Press Set Dest to select the destination index (the slot where you want the robot to place the cartridge), then press Start.

Exercise	Description	Additional instructions
Scan	The bar code scanner scans all the elements in the library.	After the system scans all the elements, it stores the data in the cartridge inventory and displays any scan errors on the Label Information screen (see page 201).
Scan Element	The bar code scanner scans a single bar code label.	When you select Scan Element, the Set Command Parameters screen appears. Press Set Begin to specify the element index you want to scan. Then press Start. After the system scans the label, it stores the data in the cartridge inventory and displays any scan errors on the Label Information screen (see page 201).
Home Robot	The following library components return to home position: ▪ The gripper ▪ The robot on the reach axis, the horizontal axis, and the vertical axis ▪ The drum This exercise also recalibrates the home (zero) position for all the axes.	

Performing diagnostic exercises

This section describes how to perform diagnostic exercises using the Library Diagnostics Menu. This menu provides options for performing specific robot movements.

Using the Library Diagnostics Menu

The Library Diagnostics Menu provides options for testing basic functions of the components in your library. You can use these tests to troubleshoot library hardware problems.

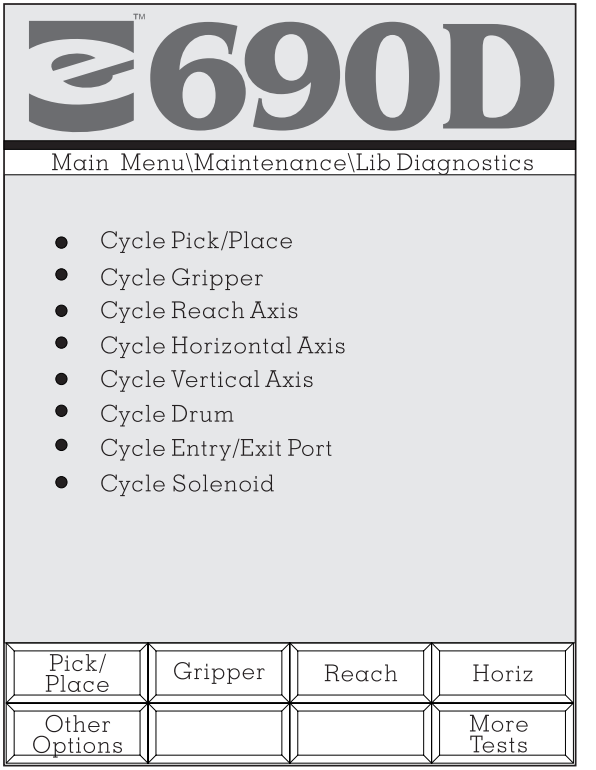
Starting library test exercises

Before performing library test exercises from the operator panel, do the following:

1. If necessary, disable security (see page 63).
2. Change the control mode to LCD (see page 85).
3. Refer to page 165 to 167 for a numbering scheme of the element indexes. (You may need these numbers to perform the library tests.)

Performing library tests

1. From the Maintenance Menu, select Library Diagnostics Menu. A screen of library tests appears:



2. Press the softkey corresponding to the exercise you want to select, as described in the table on the following page.

3. Set any required parameters and then press Start.

   Note: If you want to cancel a test in progress, press Stop.

4. When the test is finished, the screen displays a Status Complete message and any errors that occurred during the test. Press OK to return to the Library Diagnostics Menu.

The following table describes each test and also provides additional instructions for performing the tests (if applicable).

Test	Description	Additional instructions
Cycle Pick/Place	The robot takes a cartridge from a specified element and replaces it in the same location.	Press Set Source to select the source index (where you want the robot to pick and place the cartridge). Press Start to begin the test (the default is 10 cycles) or press Set Cycles to select the number of cycles you want to run.
Cycle Gripper	The grip fingers on the robot open and close.	Press Start to begin the test (the default is 10 cycles) or press Set Cycles to select the number of cycles you want to run.
Cycle Reach Axis	On the reach axis (the axis on which the robot moves in and out), the robot moves to the center of the vertical axis. Then, it extends toward the cartridge magazine and back to the home position on the reach axis.	
Cycle Horizontal Axis	On the horizontal axis (the axis on which the robot moves from side to side), the robot moves to the home position in front of the first drive (located in the top far left position, as viewed from the front). Then, it moves in front of the second drive and back to the home position.	

Test	Description	Additional instructions
Cycle Vertical Axis	The robot moves to the home position on the vertical axis (the axis on which the robot moves up and down). Then, it moves to the top of the vertical axis and back to the home position.	Press Start to begin the test (the default is 10 cycles) or press Set Cycles to select the number of cycles you want to run.
Cycle Drum	From a home position, the drum rotates 180 degrees clockwise and then 180 degrees counter-clockwise to complete the rotation.	
Cycle Entry/Exit Port	The entry/exit port extends and retracts.	
Cycle Solenoid	The solenoid that controls the locking mechanism on the front door extends and retracts.	Press Start to begin the test (the default is 10 cycles) or press Set Cycles to select the number of cycles you want to run. You will hear a click each time the solenoid extends and retracts.

10 Library Status

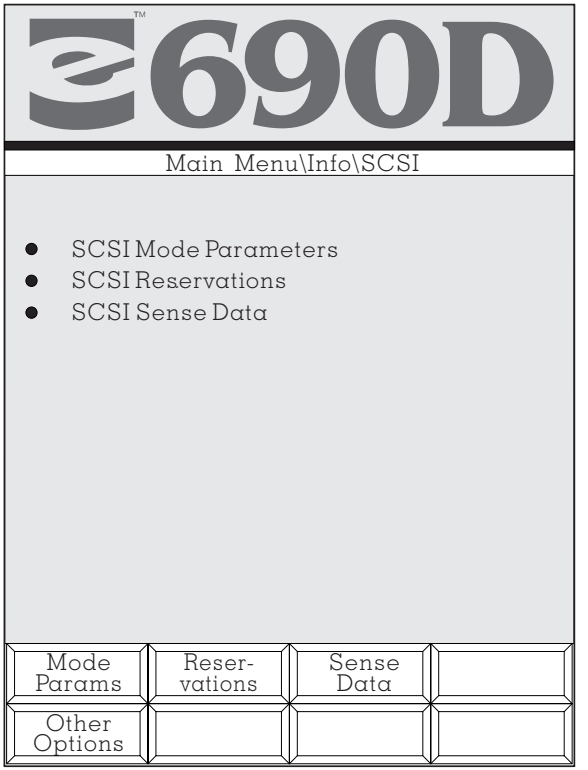
This chapter describes how to display information about library status, available from the Information Menu. The functions in the Information Menu are mainly for use by technical support and application developers. You may be asked by technical support personnel to display one of these screens.

You can use the Information Menu screens to view the following library information:

- **SCSI Information Menu**. Contains SCSI mode parameters, reservations, and sense data.
- **Statistics.** Contains data about the library, tape drives, and slots.
- **System Sensors.** Contains information about the library's sensors.
- **Library Command History.** Displays the contents of the history buffer.
- **Inventory Menu.** Contains information about bar code labels and elements.

Viewing SCSI data

You can access SCSI data from the SCSI Information Menu. To display this menu, select SCSI Information from the Information Menu. The following screen appears:



SCSI Mode Parameters screen

The SCSI Mode Parameters screen displays the settings of various operating mode parameters. These parameters are equivalent to the parameters reported by the library in response to a MODE SENSE command issued by the application software.

Typically, the values of these parameters are changed by a MODE SELECT command. For information about the MODE SENSE and MODE SELECT commands, refer to the *Exabyte 690D Library SCSI Reference*.

The SCSI Mode Parameters screen displays three types of parameters, as follows:

- Element Address Page
- Parity Page
- LCD Page

For each parameter, the SCSI Mode Parameters screen shows the Current, Saved, and Default values:

- The *current* value is the value currently active. It is either the power-on default or a temporary value set by the latest MODE SELECT command.

- The *saved* value is the value specified as the power-on default by a MODE SELECT command. After a saved value has been specified with a MODE SELECT command, this value takes effect immediately and each time you power on the library.

- The *default* value is the original value set at the factory.

To view SCSI mode parameters:

1. From the Information Menu, select SCSI Information.
2. From the SCSI Information screen, press the Mode Params softkey.
3. To view additional parameters, press Page Up and Page Down.
4. To return to the SCSI Information screen, press Other Options and then Previous.

The table below describes the items on the SCSI Mode Parameters screen.

SCSI Mode parameters:	
Robot *	The element address of the robot.
Storage*	The element address of the first storage location, which is the fixed cartridge slot. See page 165 to 167 for a complete numbering scheme.
Drive*	The element address of the tape drive, starting with the first drive (corresponding to element index number 451). See pages 165 to 167 for a complete element index numbering scheme.
Drive Number	The number of tape drives installed.
Parity	Whether SCSI parity checking is enabled for the library. When the parity option is on, the library checks all data coming across the SCSI bus for parity.
Parity Retries	The number of times the library will retry a SCSI phase after detecting a parity error.
Security	Whether security has been enabled by SCSI. (Security also can be enabled from the LCD; see page 63.)
Write Line 1	Whether the text displayed on each of the Status Screen lines is defined by the LCD Mode page in SCSI.
Write Line 2	
Write Line 3	
Write Line 4	

* When set to their default values, the element addresses reported on this screen are the same as element indexes shown on pages 165 to 167. However, unlike element indexes, which cannot be changed, addresses can be changed with a MODE SELECT command.

SCSI Reservations screen

The SCSI Reservations screen indicates if the library or its elements are reserved for exclusive use by a host computer. The library and its elements are reserved and released through SCSI commands (RESERVE and RELEASE).

You may want to view SCSI reservations if you are operating the library in a multi-host environment and you want to determine which elements are reserved by which host. Multiple hosts can reserve different elements within a single library. For example, Host 1 may reserve cartridge slots 1 through 45 for its exclusive use, while Host 2 may reserve slots 16 through 90.

To view SCSI reservations:

1. Select SCSI Reservations from the SCSI Information Menu. The SCSI Reservation screen appears.

2. To view additional elements, press Page Up and Page Down.

3. To return to the SCSI Information Menu, press Other Options, then press Previous.

The information in the SCSI Reservations screen is described in the following table.

Unit reservations:	
Unit Reserved	0 - The library is not reserved by the host. 1 - The library is reserved by the host.
Host ID	The host's ID, if the library is reserved.
Element reservations:	
Index	The index of the element.
Element Address	The address of the element.
Elem Type	The type of element, which can include: ▪ Slot (cartridge slot) ▪ EEP (entry/exit port slot) ▪ Robot ▪ Drive
Host ID	The SCSI ID of the host that currently has the element reserved.
Reservation ID	The ID that the element is reserved under. This is a number assigned to the element by a host when the reservation was made. If there is no reservation, the Reservation ID and Host ID columns display "-- none --".

SCSI Sense Data screen

When an error or change of state occurs, the application software can issue a SCSI REQUEST SENSE command to the library to obtain information. This information, called *sense data*, is displayed on the SCSI Sense Data screen (along with any Pending Unit Attention information). This data provides information to help you diagnose problems with the library. For more detailed information about SCSI sense data, refer to the *Exabyte 690D Library SCSI Reference*.

To view the sense data:

1. From the SCSI Information Menu, select SCSI Sense Data. The SCSI Sense Data screen appears.

2. Press Page Up and Page Down to view information for additional devices.

The following table describes the information in the SCSI Sense Data screen.

Sense data:	
Host ID	The SCSI ID of the host(s) connected to the library.
Sense Key	This is the sense key returned by the REQUEST SENSE command. The sense keys are: **0h–No Sense** There is no specific sense key information to report. **2h–Not Ready** The library is not ready to perform motion commands. **4h–Hardware Error** The library detected a hardware failure during a self-test or while performing a command. Operator intervention may be required. **5h–Illegal Request** There was an illegal parameter in the command descriptor block or in the additional parameters supplied as data for a command, or the library is in the wrong mode to execute the command. **6h–Unit Attention** The cartridge inventory may have been violated. **Bh–Aborted Command** The library aborted the command. The initiator may be able to recover by trying the command again.
ASC	This is the Additional Sense Code, which, along with the Additional Sense Code Qualifier, provides information describing a specific error condition.
ASCQ	This is the Additional Sense Code Qualifier, which, along with the Additional Sense Code, provides information describing a specific error condition.
Byte 15	This is the Sense Key Specific data, which provides additional information about an error condition. This information is valid only for the Illegal Request (5h) sense key.

Sense data: ***(continued)***	
Byte 17	This is the second byte of the Field Pointer data. This information is valid only for the Illegal Request (5h) sense key.
Pend UA (Pending Unit Attention)	This code indicates a status change in the library since its last SCSI communication with the host. (The next SCSI communication will notify the host of this change.) The Unit Attention codes correspond to the status information that is sent to the host, as follows: 0 – None 1 – Reset (the library has been reset or powered on) 2 – Door closed (the door has been opened and closed) 3 – Mode Select Change (a MODE SELECT command has been issued) 4 – New firmware (a firmware upgrade has been loaded) 5 – Console to SCSI (the robot control mode has been changed from console to SCSI) 6 – LCD to SCSI (the robot control mode has been changed from LCD to SCSI)

Viewing library statistics

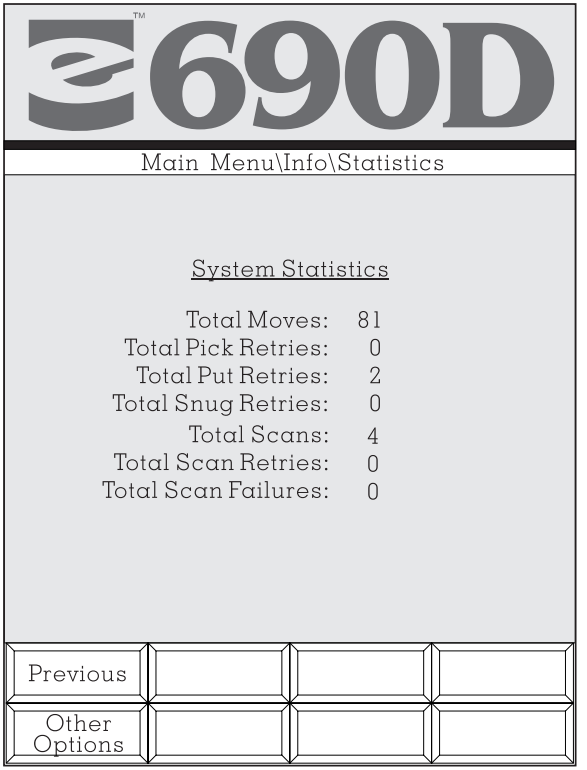
The Statistics Menu allows you to view historical data about robot moves to cartridge slots and tape drives. The Statistics Menu allows you to display the following information:

- **System statistics.** This includes data about robot moves to all library elements and scans of all library elements (a cumulative total that includes cartridge slots and tape drives).
- **Element statistics.** This includes data about the robot moves and scans to the cartridge slots, EE port slots, and the tape drives.

System Statistics

1. From the Information Menu, select Statistics.

2. Press System Stats. The following screen appears:



The following table describes the information in the System Statistics screen.

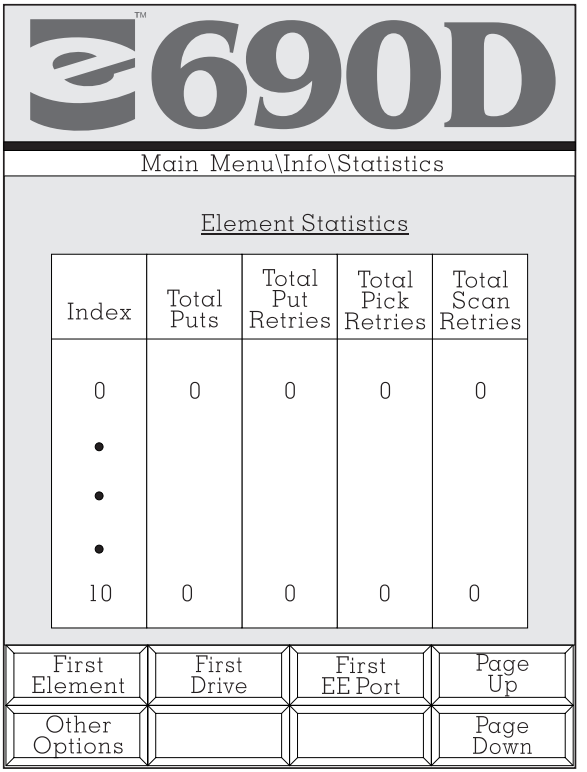
Note: The System Statistics field values represent cumulative totals from the time the library was first installed; they do not restart from zero each time the library is powered on.

System Statistics	
Field name	**Description**
Total Moves	The number of times the robot has picked a cartridge and placed it in a slot or tape drive.
Total Pick Retries	The number of times the robot retried picking a cartridge.
Total Put Retries	The number of times the robot retried placing a cartridge.
Total Snug Retries	The number of times the robot squared up the cartridge in the gripper before placing it in a slot or a tape drive.
Total Scans	The number of times the robot scanned a bar code label.
Total Scan Retries	The number of times the robot retried scanning a bar code label.
Total Scan Failures	The number of times the robot failed to scan a bar code. (The robot tries to scan a bar code several times before it logs a failure.)

Element statistics

The Element Statistics screen allows you to view statistics for the cartridge slots, the tape drives, and the entry/exit port.

1. From the Information Menu, select Statistics, then select Element Statistics. The following screen appears:



2. To view additional elements, press Page Up and Page Down.

The following table describes the information in the Element Statistics screen.

Note: The Element Statistics field values do not represent cumulative totals; they start from zero each time the library is powered on or reset.

Element Statistics	
Field name	**Description**
Index	The element index number.
Total Puts	The number of times a cartridge was placed in that element since the library was turned on.
Total Put Retries	The number of times the robot retried placing a cartridge in that element.
Total Pick Retries	The number of times the robot retried picking from that element.
Total Scan Retries	The number of times the robot retried scanning that element.

Tape drive statistics

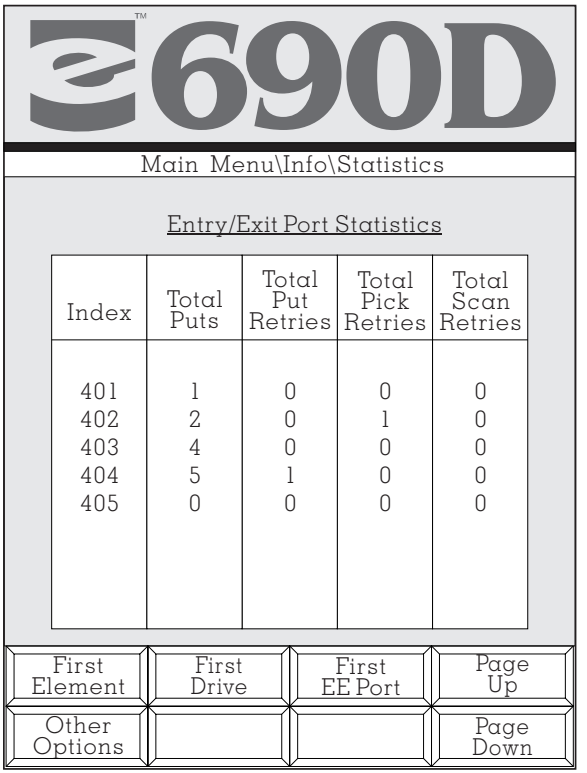
To view statistics for the tape drive, see page 109.

Entry/exit port statistics

To view statistics for the entry/exit port slots:

1. From the Information Menu, select Statistics, then Element Statistics.

2. From the Element Statistics screen, press EE Port. The statistics for the entry/exit port appear:



3. To view statistics for the entry/exit port slot, press Page Down.

4. Continue pressing Page Down until you have viewed statistics for all of the entry/exit port slots.

The following table describes the information in the Entry/Exit Port Statistics screen.

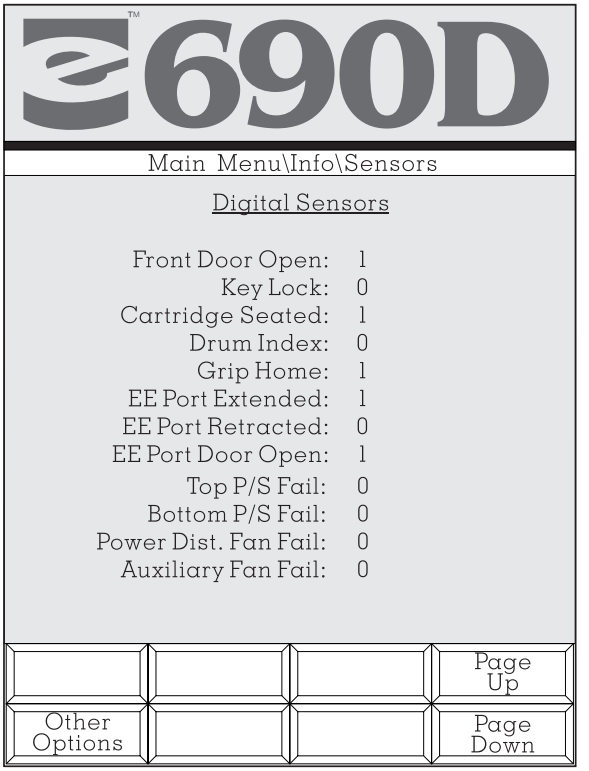
Note: The EE Port Statistics field values do not represent cumulative totals; they start from zero each time the library is powered on.

Entry/Exit Port Statistics	
Field name	**Description**
Index	The element index number (in this case, the entry/exit port data cartridge slot number).
Total Puts	The number of times a cartridge was placed in that entry/exit port slot since the library was turned on.
Total Put Retries	The number of times the robot retried placing a cartridge in that slot.
Total Pick Retries	The number of times the robot retried picking from that slot.
Total Scan Retries	The number of times the robot retried scanning that slot.

Viewing system sensors

The System Sensors screens enable you to troubleshoot hardware problems by checking the current status of the library's internal mechanical sensors. To view system sensors:

1. From the Information Menu, select System Sensors. The Digital Sensors screen appears:



2. To view additional sensors, press Page Down.

3. To display the Analog Sensor screen, press Page Down twice.

The following table describes the information in the System Sensors screen.

Digital System Sensors	
Field name	**Description**
Front Door Open	0 – The library door is closed. 1 – The library door is open.
Key Lock	0 – The library door is unlocked. 1 – The library door is locked.
Cartridge Seated	0 – No cartridge is seated in the robot. 1 – A cartridge is seated in the robot.
Drum Index	0 – The drum is located 180° from its home position. 1 – The drum is not located 180° from its home position.
Grip Home	0 – The gripper is not in the home position; grip fingers are closed. 1 – The gripper is in the home position; grip fingers are open.
EE Port Extended	0 – The entry/exit port is not extended. 1 – The entry/exit port is extended.
EE Port Retracted	0 – The entry/exit port is not retracted. 1 – The entry/exit port is retracted.
EE Port Door Open	0 – The entry/exit port door is closed. 1 – The entry/exit port door is open.
Top P/S Fail	0 – The top library power supply is operational. 1 – The top library power supply has failed.
Bottom P/S Fail	0 – The bottom library power supply is operational. 1 – The bottom library power supply has failed.
Power Dist. Fan Fail	0 – The fan for the power supply is operational. 1 – The fan for the power supply has failed.

Digital System Sensors *(continued)*	
Field name	**Description**
Auxiliary Fan Fail	0 – The auxiliary fan is operational. 1 – The auxiliary fan has failed.
Drive *n* Fan Fail	0 – Tape Drive *n*'s fan (where *n* represents the tape drive number) is operational. 1 – Tape Drive *n*'s fan has failed.
Drive *n* Present	0 – Tape Drive *n* is not present. 1 – Tape Drive *n* is present.

Analog System Sensors	
Field name	**Description**
+ 5V (mV)	The output of the + 5-volt power supply in millivolts.
-12V (mV)	The output of the -12-volt power supply in millivolts.
+ 12V (mv)	The output of the + 12-volt power supply in millivolts.
+ 24V (mV)	The output of the + 24-volt power supply in millivolts.

Viewing the library command history

The Library Command History screen creates a display of the most recent 300 events that have occurred in the library. If you contact technical support personnel, a technician may ask you to scroll through this buffer looking for particular events.

To display the command history:

1. From the Information Menu, press the History softkey to select Library Command History.

2. Scroll through the buffer by pressing Page Up and Page Down. You can access more information on a specific line by pressing Page Left and Page Right.

3. To display additional information, press Full History.

4. To exit the command history screen, press Other Options.

The following table describes the fields contained in the Command History screen.

Library Command History	
Field name	**Description**
Inx (Index)	The line number of this event within the Command History. The range is 000 (the most recent event) through 299. The most recent event is displayed first.
Description	Description of the event.
Time	The time, according to the library's internal clock, that the event took place.
Date	The date, according to the library's internal calendar, that the event took place.
From	The process that logged this event.
Line	The line number of the source code that logged this event.
Seq	The sequence number of this event across all system buffers.

Viewing inventory information

The library stores inventory information in memory and uses the information to process SCSI commands from the application software. The inventory contains information about the following element types:

- Robot
- Cartridge slots
- Entry/exit port slots
- Tape drives

The Inventory Menu allows you to display the following information:

- **Bar code label information.** This includes data about whether the bar code scanner could accurately scan the label.

- **Element occupied information.** This includes data about whether the element contains a cartridge and whether a magazine or tape drive is installed.

- **Element position information.** This includes data about the exact position of each element.

Bar code label information

Using the Inventory menu, you can view information about the bar code labels attached to your cartridges. To display bar code label information:

1. From the Information Menu, select Inventory Menu. The Label Information screen appears.

2. To view additional elements, press Page Up and Page Down. To scroll to the beginning or end of the label information, press First Page or Last Page.

The following table describes the fields in the Element Label screen.

Element Label	
Field name	**Description**
Index	The element index for which the information is being displayed.
Label	If the element location contains a cartridge whose bar code label has been scanned, the Label field contains that cartridge label information.
Label Valid	Indicates whether the Label field is valid, as follows: 0 – The Label field is not valid. 1 – The Label field is valid.

Element Label *(continued)*	
Field name	**Description**
Label Error	Indicates whether the bar code scanner was unable to read the cartridge label, as follows: 0 – The bar code scan was successful, a reset condition occurred, or the door was opened. 60 – The bar code scanner could not read the bar code label because there was no label on the cartridge. 61 – The bar code scanner could not read the bar code label because the label was unreadable. 62 – The bar code scanner could not read the label because the magazine is not present. 63 – The bar code scanner could not read the label for a single slot because the inventory is questionable. 64 – The bar code scanner could not read the label because of a problem with the checksum character. 65 – The bar code scanner could not read the label for the EE port slot because the EE port is extended. 67 – The library could not collect bar code data for the fixed slot because of a firmware or hardware problem. See Appendix C for Label Error corrective actions.
Send Vol Match	Indicates whether the cartridge label matched the template sent with the last SCSI SEND VOLUME TAG command, as follows: 0 – The label did not match the template. 1 – The label matched the template.

Element occupied information

1. From the Information Menu, select Inventory Menu.

2. From the Inventory Menu, press Occupied Info. The Occupied Information screen appears.

3. To view an element with a higher index, press Page Down. To view an element with a lower index, press Page Up.

The following table describes the fields in the Occupied Information screen.

Occupied Information	
Field name	**Description**
Index	The element index for which information is being displayed.
Address	The SCSI address of this element.
Src (Source Element Index)	The index of the last storage element from which the cartridge was moved.
O (Occupied)	Indicates whether the library considers the specified element location to contain a data cartridge, as follows: 0 – The element location does not contain a data cartridge. 1 – The element location contains a data cartridge.
V (Occupied Valid)	Indicates whether the Occupied flag is accurate, as follows: 0 – The Occupied flag is questionable (may not be accurate). 1 – The Occupied flag is accurate.

Occupied Information *(continued)*	
Field name	**Description**
P (Cartridge Magazine or Tape Drive Present)	Indicates whether the magazine or tape drive is installed. If the element index references a storage element, this flag indicates whether the magazine is installed. If the element index references a tape drive, this flag indicates whether that particular drive is installed. The values for this flag are as follows: 0 – The magazine or tape drive is not installed. 1 – The magazine or tape drive is Installed.
A (Accessible)	Indicates whether the robot or tape drive is empty, a cartridge is present, or (in the case of a tape drive) the cartridge is ejected, as follows: 0 – A cartridge is present or loaded in the drive. 1 – The drive is empty, or the cartridge is ejected and ready to be picked.
Type	Indicates the type of element, as follows: Slot – A cartridge slot EEP – An entry/exit port slot Drive – A tape drive Robot – The robot

Element position information

1. From the Information Menu, select Inventory Menu.

2. From the Inventory Menu, press Position Info. The Position Information screen appears.

3. To view additional elements, press Page Up and Page Down. To scroll to the beginning or end of the element position information, press First Page or Last Page.

The following table describes the fields in the Position Information screen.

Position Information	
Field name	**Description**
Index	The element index number for which information is being displayed.
Reach	The distance (in thousandths of an inch) the robot has to move along the reach axis from its home position to touch the magazine or a cartridge in the magazine. (This field is not used for the robot.)
Horz	The distance the robot has to move along the horizontal axis from its home position to the specified element location. (This field is not used for the robot.)
Vert	The distance the robot has to move along the vertical axis from its home position to the specified element location. (This field is not used for the robot.)
Drum	The distance the drum has to rotate from its home position in order to move the specified element in front of the robot. (This field is not used for the robot.)

Calibrating the library

The library is calibrated before shipment. Under normal operating conditions, you do not need to calibrate the library. You may be asked by Exabyte Technical Support personnel to calibrate the library as part of a troubleshooting procedure.

When you calibrate the library, the robot's laser scans the calibration targets on the data cartridge magazines and the calibration block. The robot then picks the calibration block from the calibration block slot and places it into the fixed cartridge slot and the tape drives, scanning the calibration block's targets in each location to determine their exact position.

Starting library calibration

1. If necessary, disable security (see page 63).

2. Change the control mode to LCD (see page 85).

3. Open the library door and make sure the calibration block is located in the calibration block slot. (See page 7 for the location of the calibration block slot.)

4. Remove any cartridge from the fixed cartridge slot. Then, close and lock the door.

➤ **Important** Make sure the fixed cartridge slot is empty before you calibrate the library.

Make sure all six data cartridge magazines are installed before you calibrate the library.

Performing library calibration

1. From the Maintenance Menu, select Library Calibration.

2. Press Start to begin calibration.

3. When calibration is complete, the screen displays a Status Complete message. Press OK to return to the Maintenance Menu.

4. If you removed a cartridge from the fixed slot before calibrating the library, open the library door and return the cartridge to the fixed slot. Then, close and lock the library door.

The following table describes the fields in the Library Calibration screen. (You don't need this information to calibrate the library; technical support personnel may request it if you encounter problems during calibration.)

Field name	Description
Cal Data	Name of library component.
Horz (Horizontal Axis)	The distance the robot needs to move on the horizontal axis so that it is positioned in front of the element.
Vert (Vertical Axis)	The distance the robot needs to move on the vertical axis so that it is positioned in front of the element.
Drum	The distance the drum needs to rotate so that the magazine is positioned in front of the robot.
PWM (Pulse Width Modulation)	The brightness of the laser. This value is used to ensure that the laser is bright enough to accurately scan the calibration targets and bar code labels.

Notes

11 Library Firmware

This chapter describes how to access the library's firmware. You may need to access the firmware to perform a firmware upgrade, assist support personnel in a troubleshooting operation, view the LCD password, or view Ethernet information.

> ➤ **Important** Only access the firmware if Exabyte Technical Support has advised you to do so.

This chapter describes how to:

- Upgrade the library firmware via the console interface
- Upgrade the library or Ethernet firmware via FTP
- Create a diagnostic or bar code listing via the console interface
- Create a library or Ethernet diagnostic listing via FTP
- View the LCD password
- View Ethernet information

This chapter uses the following conventions:

- Keys shown boldfaced in brackets (for example, **[Enter]**), are keys you press on your host computer's keyboard.
- Words shown in Courier, for example `flash`, are commands you type.

Upgrading firmware via the console interface

These instructions describe how to upgrade the firmware using the console interface and a terminal emulation program (such as CHS Terminal or HyperTerminal).

➤ **Important** Although you can download new Ethernet firmware via the console interface, you cannot make a backup copy of the current Ethernet firmware from this interface. Therefore, it's recommended that you use FTP to upgrade the Ethernet firmware (see page 219).

Upgrading firmware via the console interface involves the following steps:

✔	Step	Description
	1	Connect the serial cable.
	2	Set the library's baud rate.
	3	Access the console interface.
	4	Copy the current firmware.
	5	Transfer the new firmware.

Before you begin

Before accessing the console interface, you must set up the following hardware and software environment:

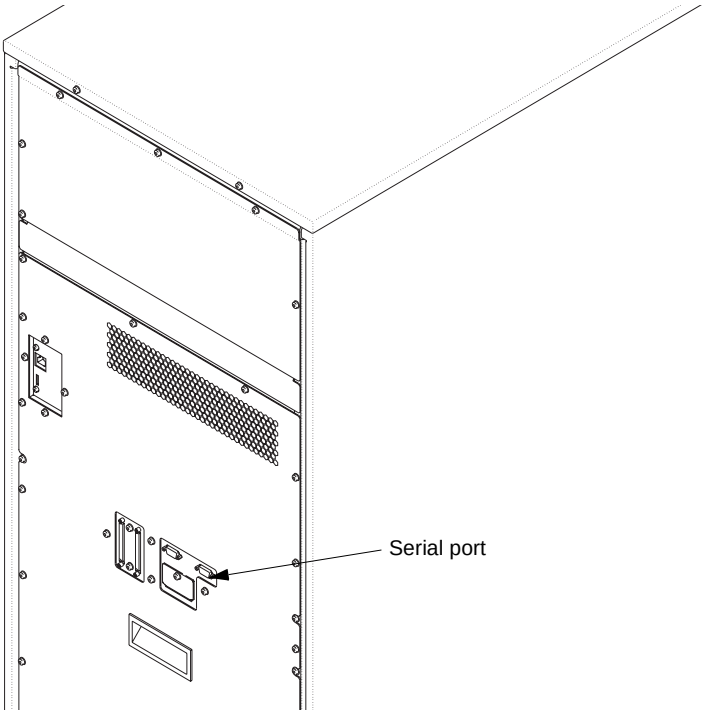
- Host computer that uses an RS232 serial port.
- A straight-through 9-pin serial cable (not a null modem cable).
- New firmware for the library or Ethernet card. You can download new firmware from Exabyte's web site (www.exabyte.com), or you can contact Exabyte Technical Support to request firmware on a diskette.
- Software that has the following options set (if applicable):

Option	Setting
Port setting: Data bits	8
Port setting: Parity	None
Port setting: Stop bits	1
Port setting: Flow control	None
Function, arrow, and control keys act as	Terminal keys
Emulation	ANSI
Data transfer protocol (for writing)	XMODEM
Font	Terminal
Baud rate	CHS Terminal supports up to 19,200 bps

Note: Exabyte provides a PC-based program, CHS Terminal, that supports the required protocol. You can download CHS Terminal from Exabyte's web site (www.exabyte.com) or request it from Exabyte Technical Support on diskette.

Step 1 – Connect the serial cable

Connect the 9-pin cable to the back of the library and to the host computer. The following figure shows the location of the 9-pin serial port on the back of the library.

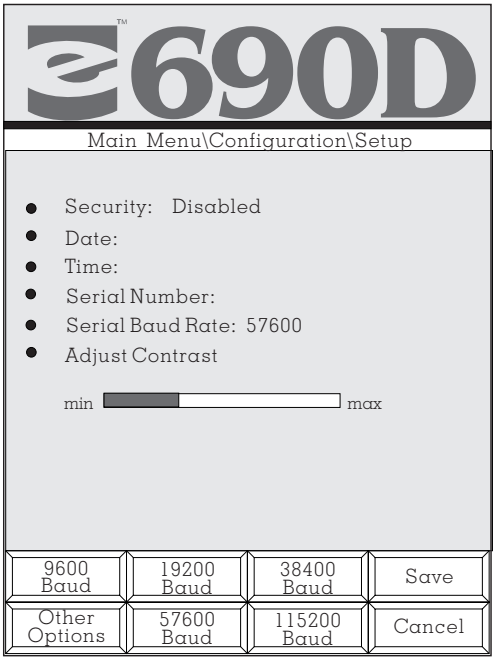


Step 2 – Set the library's baud rate

1. Make sure the library is in a ready state (idle operating status and no errors).

2. If necessary, disable security (see page 63).

3. From the Configuration Menu, select System Setup, then press Baud Rate. The following screen appears:



4. Select the baud rate that matches your host baud rate.

➤ **Important** Do not specify a baud rate for the library that is faster than the baud rate for your host.

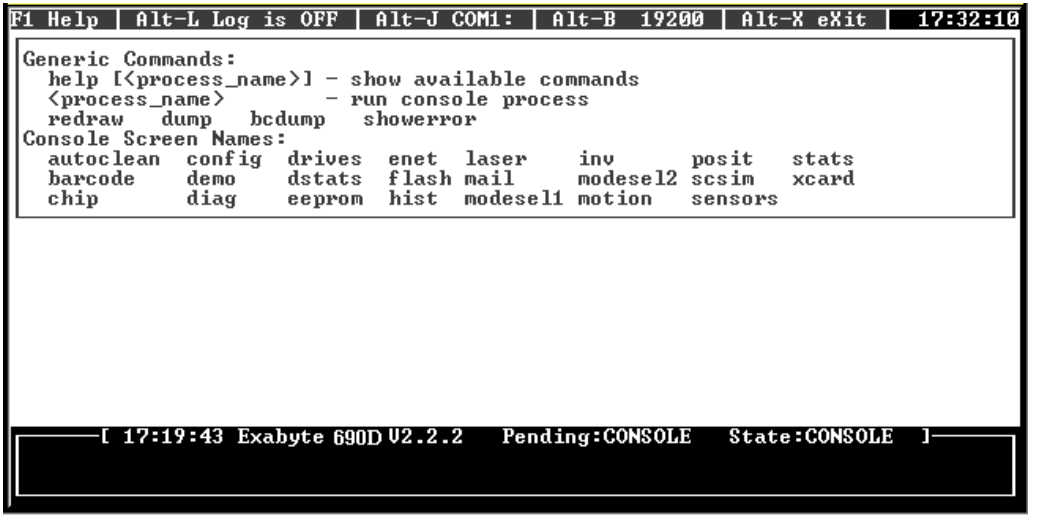
Step 3 – Access the console interface

To access the console interface:

1. From your host computer, access the software you are using to communicate with the library (for example, CHS Terminal).

2. If your monitor displays a blank screen with a box along the bottom, type `redraw` and then press **[Enter]**.

3. Type `help` and then press **[Enter]** to display the Help screen, as shown in the following figure.


F1 Help | Alt-L Log is OFF | Alt-J COM1: | Alt-B 19200 | Alt-X eXit | 17:32:10
Generic Commands:
help [<process_name>] - show available commands
<process_name> - run console process
redraw dump bcdump showerror
Console Screen Names:
autoclean config drives enet laser inv posit stats
barcode demo dstats flash mail modesel2 scsim xcard
chip diag eeprom hist modesel1 motion sensors
[17:19:43 Exabyte 690D V2.2.2 Pending:CONSOLE State:CONSOLE]

Note: If garbled characters appear on your screen, make sure you have the same baud rate set for the host as you do for the library. (For CHS Terminal users, the baud rate displays next to `Alt-B` on the top of the screen.)

Step 4 – Copy the current firmware

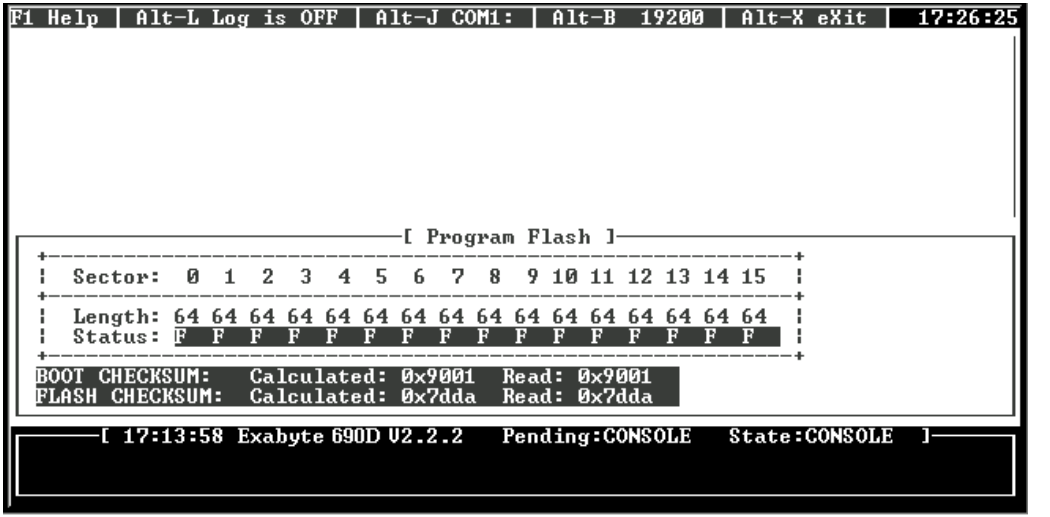
As a precautionary measure, you should make a copy of the current firmware. You can copy the current firmware by using a SCSI command, or by using the console Read Firmware command (if supported by your software).

> **CAUTION**
>
> Because of memory limitations, the library cannot validate the data in the new firmware file before erasing the current firmware. If an error occurs while the new firmware is being transferred, the library will not operate unless you can provide a copy of the current firmware. Therefore, *before* transferring the new firmware, make a copy of the current firmware by following the steps below.

To make a copy of the current firmware by using a SCSI command, use the READ BUFFER or READ FIRMWARE SCSI command. For more information about using the SCSI commands, refer to *Exabyte 690D Library SCSI Reference*.

To make a copy of the current firmware by using the Read Firmware command, follow these steps:

1. From the Help screen, type `flash`. The Program Flash screen appears:


F1 Help | Alt-L Log is OFF | Alt-J COM1: | Alt-B 19200 | Alt-X eXit | 17:26:25
[Program Flash]
Sector: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Length: 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64
Status: F F F F F F F F F F F F F F F F
BOOT CHECKSUM: Calculated: 0x9001 Read: 0x9001
FLASH CHECKSUM: Calculated: 0x7dda Read: 0x7dda
[17:13:58 Exabyte 690D V2.2.2 Pending:CONSOLE State:CONSOLE]

2. To copy the current library firmware, type `rflash`.

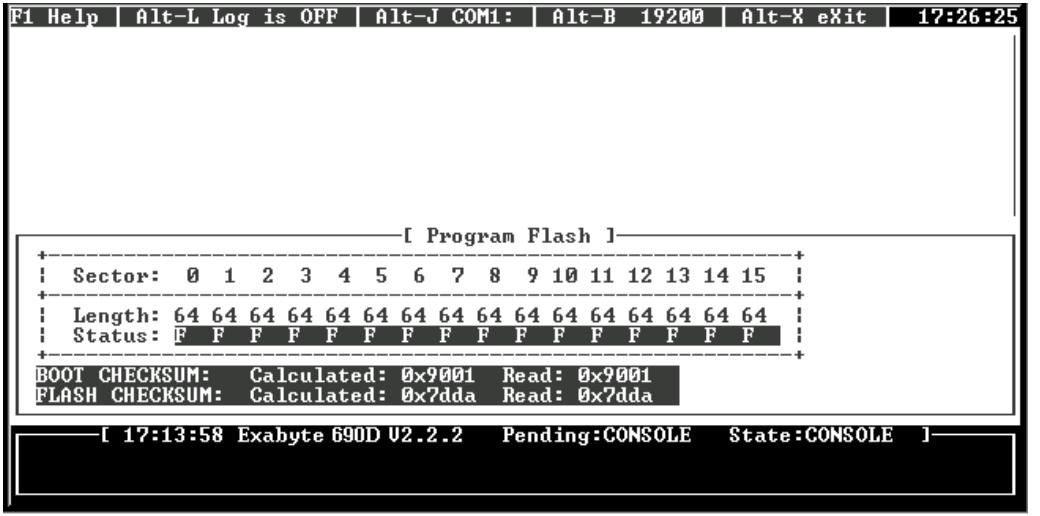
3. Use your terminal emulation program to specify the destination location (path and filename) of the current firmware.

Step 5 – Transfer the new firmware

To transfer the new firmware to the library or Ethernet card:

1. From the Program Flash screen (shown below), transfer the firmware file as follows:

   - For the library firmware, type `pflash`.
   - For the Ethernet firmware, type `penetflash`.


F1 Help | Alt-L Log is OFF | Alt-J COM1: | Alt-B 19200 | Alt-X eXit | 17:26:25
[Program Flash]
Sector: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Length: 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64 64
Status: F F F F F F F F F F F F F F F F
BOOT CHECKSUM: Calculated: 0x9001 Read: 0x9001
FLASH CHECKSUM: Calculated: 0x7dda Read: 0x7dda
[17:13:58 Exabyte 690D V2.2.2 Pending:CONSOLE State:CONSOLE]

   The library erases the current firmware and then displays the following prompt: `Begin XMODEM download of flash code`.

2. Use your terminal emulation program to specify the source location (path and filename) of the new firmware.

   Note: If necessary, CHS Terminal users can use wild card characters (*.*) and then press **[Enter]** to search the host's hard drives and directories for the desired file name.

3. Select or type in the file name you want and then press **[Enter]**.

> **CAUTION**
>
> If you are transferring Ethernet firmware code, do not attempt to perform any library or keyboard during the firmware transfer. Make sure the firmware transfer is complete by waiting until the library automatically resets.

The system initiates the firmware upgrade and displays its progress on the screen. When the upgrade is successfully completed, the library automatically resets.

Upgrading firmware via FTP

These instructions describe how to upgrade the library or Ethernet firmware via FTP. Upgrading firmware via FTP involves the following steps:

✔	Step	Description
	1	Connect the Ethernet cable.
	2	Access the FTP utility.
	3	Copy the current firmware.
	4	Rename the new firmware.
	5	Transfer the new firmware.

Before you begin

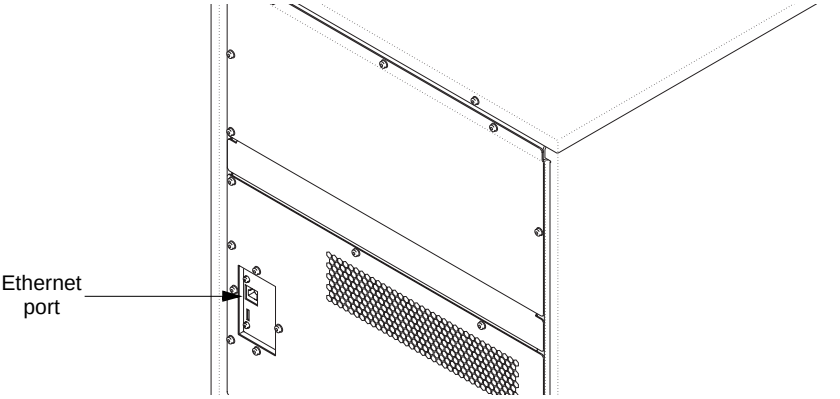
To access the new firmware via FTP, you must set up the following hardware and software environment:

- Host computer that uses a pin-through-hole RJ-45 shielded Ethernet connector.
- A Category 3 (10Base-T connection) or Category 5 (100Base-T connection) data-grade cable.
- New firmware for the library or Ethernet card. You can download new firmware from Exabyte's web site (www.exabyte.com), or you can contact Exabyte Technical Support to request firmware on a diskette.
- Software that supports RFC 959 file transfer protocol.

Step 1 – Connect the Ethernet cable

To connect the Ethernet cable to the library and host computer:

1. Insert one end of the cable into the Ethernet port (shown in the following figure) until you hear it snap into place.



2. Connect the other end of the cable to the computer where your FTP utility is installed.

Step 2 – Access the FTP utility

From your host computer, access the FTP utility you are using to communicate with the library, as follows:

1. Make sure the library is in a ready state (idle operating status and no errors).

2. Activate the FTP utility you are going to use to transfer the firmware to the library or Ethernet card.

Note: If you do not know the FTP user name or password, you can view them from the Ethernet Information screen via the console interface (see page 230).

Step 3 – Copy the current firmware

As a precautionary measure, you should make a copy of the current firmware. You can copy the current firmware by using an FTP command.

> **CAUTION**
>
> Because of memory limitations, the library cannot validate the data in the new firmware file before erasing the current firmware. If an error occurs while the new firmware is being transferred, the library will not operate unless you can provide a copy of the current firmware. Therefore, *before* transferring the new firmware, make a copy of the current firmware by following the steps below.

To copy the current firmware, follow these steps:

1. Create a directory named after the current (not the new) firmware version number. For example, if the current firmware version is 2.1.7, name the directory 2_1_7.

Note: If necessary, you can obtain the current library or Ethernet firmware version number from the Information screen on the library's LCD.

2. Copy the current firmware from the library or Ethernet card into the directory you just created as follows:

   - For the library, get the file named `arrowhed.sqs`.
   - For the Ethernet card, get the file named `enet.sqs`.

Step 4 – Rename the new firmware

Before you can transfer the new firmware to the library or Ethernet card, you need to rename the new firmware file so that the library can recognize it when the file is transferred via FTP.

To rename the new firmware file:

1. Create a directory named after the new firmware version number. For example, if the new firmware version is 2.2.2, name the directory 2_2_2. If the Ethernet firmware version is 1.11.7, name the directory 1_11_7, and so on.

2. Download the new library or Ethernet firmware file into this directory.

3. In the directory that contains the new firmware file, rename the file as follows:

   - For the library firmware file, rename the file `arrowhed.sqs`.
   - For the Ethernet firmware file, rename the file `enet.sqs`.

Step 5 – Transfer the new firmware

To transfer the new firmware, use the FTP command for your utility to put the library or Ethernet files, as follows:

- For the library, put `arrowhed.sqs`.
- For the Ethernet card, put `enet.sqs`.

➤ **Important** Make sure you obtain this file from the directory named after the *new* library or Ethernet firmware version number.

The system initiates the firmware upgrade, displaying its progress on the library's LCD screen. When the upgrade has completed successfully, the library automatically resets.

CAUTION

Do not attempt to perform library operations or power down the library until after the library automatically resets.

Creating a diagnostic or bar code listing via the console interface

If you report a problem to Exabyte Technical Support, you may be asked to create a diagnostic or bar code listing via the console interface. A diagnostic or bar code listing is created when you use a terminal emulation program (such as CHS Terminal) to send an ASCII copy of the diagnostic buffer from the library to the host computer.This buffer information can be used by support personnel to troubleshoot incidents with the library.

Before you begin

Before accessing the console interface, you must set up the following hardware and software environment:

- Host computer that uses an RS232 serial port.
- A straight-through 9-pin serial cable (not a null modem cable).
- Software that supports ANSI 3.64 terminal protocol and XMODEM data transfer protocol, such as CHS Terminal (see the table on page 211 for additional software settings).

Create the diagnostic listing

To create a library diagnostic or bar code listing:

1. If necessary, connect the serial cable to the library and host computer (see page 212).

2. Make sure the library's baud rate matches the host baud rate (see page 213).

3. From your host computer, access the software you are using to communicate with the library (for example, CHS Terminal).

4. From the Help screen (see page 214), type the appropriate command as follows:

   - For a library diagnostic listing, type `dump`.
   - For a bar code listing, type `bcdump`.

5. Press **[Enter]**.

6. Using your terminal emulation program, specify the file name and specify ASCII as the file transfer type for the diagnostic or bar code data. (For CHS Terminal users, press **[Alt-i]** and specify the file name.)

Note: If you do not specify a path with your file name, the file is written to the default directory on the current drive.

7. Press **[Enter]**.

8. When the file is completely transferred, your terminal emulation program may require you to close the file and press **[Enter]** to return to the console screen.

Creating a library or Ethernet diagnostic listing via FTP

If you report a problem to Exabyte Technical Support, you may be asked to create a library or Ethernet diagnostic listing via FTP. A library or Ethernet diagnostic listing is created when you use an FTP utility to send an ASCII copy of the diagnostic buffer from the library to the host computer. This buffer information can be used by support personnel to troubleshoot incidents with the library.

Before you begin

To access the new firmware via FTP, you must set up the following hardware and software environment:

- Host computer that uses a pin-through-hole RJ-45 shielded Ethernet connector.
- A Category 3 (10Base-T connection) or Category 5 (100Base-T connection) data-grade cable.
- Software that supports RFC 959 file transfer protocol.

Create the diagnostic listing

To create a library or Ethernet diagnostic listing via FTP:

1. If necessary, connect the Ethernet cable to the library and the host computer (see page 220).

2. From your host computer, activate the FTP utility you are going to use to send the diagnostic buffer information from the library to the host computer.

3. Make sure the FTP file transfer type is set to ASCII.

4. Use the FTP command for your utility to get the diagnostic listing, as follows:

   - For a library diagnostic listing, get `libtrace.txt`.
   - For an Ethernet diagnostic listing, get `etrace.txt`.

5. If necessary, specify a destination location (path and filename) for the diagnostic listing.

Viewing the LCD password

You can view the LCD password from the Configuration Information screen on the console interface.

Before you begin

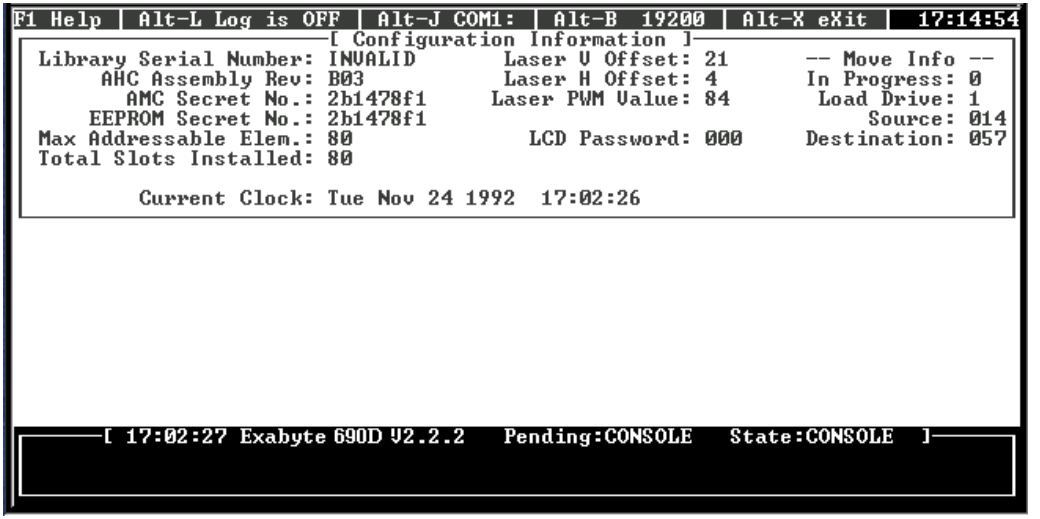
Before accessing the console interface, you must set up the following hardware and software environment:

- Host computer that uses an RS232 serial port.
- A straight-through 9-pin serial cable (not a null modem cable).
- Software that supports ANSI 3.64 terminal protocol and XMODEM data transfer protocol, such as CHS Terminal (see the table on page 211 for additional software settings).

View the LCD password

1. If necessary, connect the serial cable to the library and the host computer (see page 212).
2. Make sure the library's baud rate matches the host baud rate (see page 213).
3. From your host computer, access the software you are using to communicate with the library (for example, CHS Terminal).

4. From the Help screen (see page 214), type `config` and then press **[Enter]**. The Configuration Information screen appears:


F1 Help | Alt-L Log is OFF | Alt-J COM1: | Alt-B 19200 | Alt-X eXit | 17:14:54
[Configuration Information]
Library Serial Number: INVALID
AHC Assembly Rev: B03
AMC Secret No.: 2b1478f1
EEPROM Secret No.: 2b1478f1
Max Addressable Elem.: 80
Total Slots Installed: 80
Current Clock: Tue Nov 24 1992 17:02:26
Laser V Offset: 21
Laser H Offset: 4
Laser PWM Value: 84
LCD Password: 000
-- Move Info --
In Progress: 0
Load Drive: 1
Source: 014
Destination: 057
[17:02:27 Exabyte 690D V2.2.2 Pending:CONSOLE State:CONSOLE]

You can view the LCD password value to the right of the field name. In the example above, the LCD password is set to 000.

Viewing Ethernet information

You can view Ethernet information, such as the FTP user name and password from the Ethernet Information screen via the console interface.

Before you begin

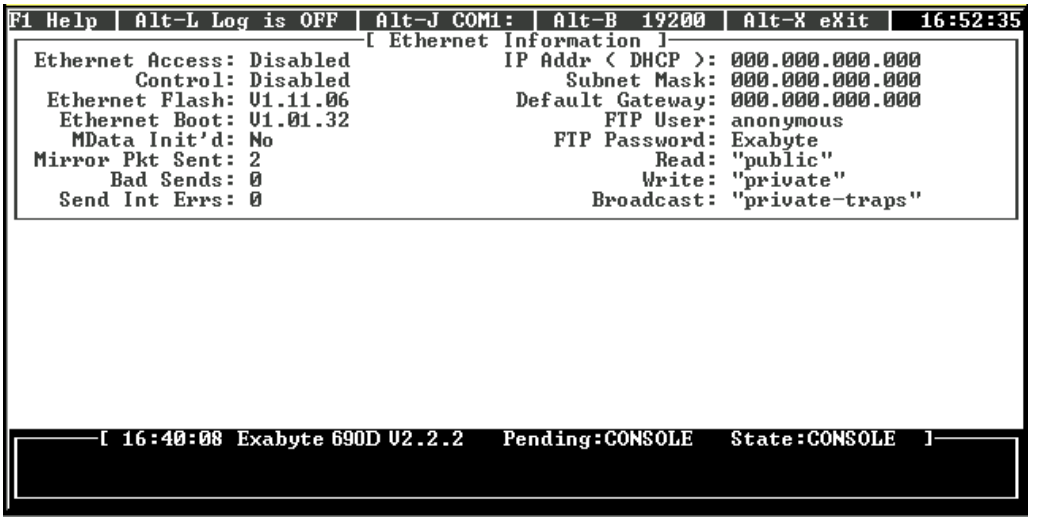
Before accessing the console interface, you must set up the following hardware and software environment:

- Host computer that uses an RS232 serial port.
- A straight-through 9-pin serial cable (not a null modem cable).
- Software that supports ANSI 3.64 terminal protocol and XMODEM data transfer protocol, such as CHS Terminal (see the table on page 211 for additional software settings).

View Ethernet information

1. If necessary, connect the serial cable to the library and the host computer (see page 212).
2. Make sure the library's baud rate matches the host baud rate (see page 213).
3. From your host computer, access the software you are using to communicate with the library (for example, CHS Terminal).

4. From the Help screen (see page 214), type `enet` and then press **[Enter]**. The Ethernet Information screen appears:


F1 Help | Alt-L Log is OFF | Alt-J COM1: | Alt-B 19200 | Alt-X eXit | 16:52:35
[Ethernet Information]
Ethernet Access: Disabled
Control: Disabled
Ethernet Flash: V1.11.06
Ethernet Boot: V1.01.32
MData Init'd: No
Mirror Pkt Sent: 2
Bad Sends: 0
Send Int Errs: 0
IP Addr (DHCP): 000.000.000.000
Subnet Mask: 000.000.000.000
Default Gateway: 000.000.000.000
FTP User: anonymous
FTP Password: Exabyte
Read: "public"
Write: "private"
Broadcast: "private-traps"
[16:40:08 Exabyte 690D V2.2.2 Pending:CONSOLE State:CONSOLE]

From the Ethernet Information screen, you can view and change the FTP user name and password, the community string values, the IP address and other information.

Notes

12 Troubleshooting

This chapter provides a list of suggestions for solving problems that may occur when you are installing and operating the library and the enclosed tape drives. The instructions in this chapter are basic troubleshooting guidelines.

This chapter is divided into the following sections:

- Library installation problems
- Library operation problems
- Tape drive operation problems
- Advanced troubleshooting

Note: If an error code is displayed on the LCD, refer to Appendix D. If LEDs on the tape drive are flashing, see page 97.

Library installation problems

If your library and application software are not communicating after installation, check the following:

✔ **SCSI IDs.** Make sure that the SCSI IDs you selected for the tape drives and library are not the same as the ID used by any other SCSI device on that bus, including the SCSI adapter card. Refer to page 56 for information about setting the SCSI IDs.

➤ **Important** The library and tape drives must each have a unique SCSI ID within each SCSI bus. Because you may have multiple buses, the library does not check for duplicate SCSI IDs. It is your responsibility to make sure you do not assign duplicate IDs within a bus.

✔ **SCSI bus connections.** Make sure that you have connected the SCSI cables or terminators to the appropriate SCSI connectors on the back of the library. See page 35 and Appendix B for more information.

✔ **SCSI cabling.** Make sure that all SCSI cables are securely connected at both ends.

✔ **Single-ended, LVD, and HVD devices.** Make sure devices on the bus are either all *low-differential (LVD)* or all *high-differential (HVD)*. These devices include the controller cards, cables, and terminators. Do not mix single-ended, LVD, or HVD SCSI configurations on the same bus.

Although LVD SCSI is compatible with single-ended SCSI, the internal SCSI cable lengths for the 690D library may cause the total cable length to exceed the maximum length for a single-ended bus. Exabyte therefore does not support single-ended devices on the LVD SCSI bus for this library.

> **CAUTION**
>
> Do not connect the LVD library to a single-ended bus. Doing so may cause the bus to hang.
>
> Also, do not mix LVD and HVD devices on the same SCSI bus, or you may damage the devices attached to that bus.

✔ **Narrow SCSI and wide SCSI**. Make sure all devices within the library are wide SCSI. Do not mix narrow and wide SCSI within the library.

✔ **SCSI cable lengths**. Make sure the internal SCSI cabling does not exceed maximum lengths (see page 244).

✔ **Termination**. Make sure the SCSI buses are properly terminated as described in Appendix B. If one SCSI device previously terminated the SCSI bus but is no longer at the physical end of the bus, remove the terminators from that device.

- ✔ **Compatibility.** Make sure that your tape drives and library are compatible with the SCSI adapter card and application software you plan to use.

- ✔ **SCSI adapter card installation.** Make sure that you installed your SCSI adapter card correctly. Refer to the documentation that came with your card for installation and troubleshooting instructions. Pay special attention to steps describing setting various jumpers and switches on the card. Make sure that the card is properly seated.

- ✔ **Software installation.** Make sure that your application software is installed correctly. (Refer to the software documentation.) Pay special attention to steps that describe how to configure the software for use with the library and tape drives.

- ✔ **Control mode.** Make certain the library is operating in the correct control mode. For most applications, the control mode should be set to SCSI. See page 84 for more information.

After checking the items above, reset the library as described on page 93.

Library operation problems

If the library has been successfully operating in the past, but is now experiencing problems, check the following:

- ✔ **Control mode**. If you are using an application software package to control robot operations, the library must be set to SCSI mode. See page 84 for more information.

- ✔ **Security**. Make sure that security is set correctly for the operation you are trying to perform. If security is enabled, you cannot perform many operations on the LCD, and you cannot open the door. Security can be enabled from the LCD (see page 62) or from your application software with a SCSI command.

- ✔ **Door open**. Make sure the door is closed and locked. You can check the Front Door Open and Key Lock lines on the System Sensors screen to determine if the door and key lock sensors are properly working (see page 195).

- ✔ **Robot operation**. You can use the selections in the Maintenance Menu (Library Command and Library Diagnostics) to determine if the robot is functioning properly. See page 168.

- ✔ **Fuse.** Make sure the fuse is good (check for a broken filament inside the glass cylinder). To replace a fuse, see page 113.

Tape drive operation problems

If you have been successfully operating the application software and library in the past, but are now experiencing problems reading and writing data, check the following:

- ✔ **Write-protect switch**. If you are writing data, make sure the cartridge is write enabled (make sure the orange rectangle is not visible).

- ✔ **Cartridge brand**. Make sure you are using a supported data cartridge for the DLT 7000 or DLT 8000. See page 87 for more information.

- ✔ **Cartridge age**. If the cartridge has been in use for a long time or if it has been used frequently, try using a new cartridge.

- ✔ **Cleaning**. Clean the tape drive as described on page 102. Make sure you are using the recommended cleaning cartridge for the DLT 7000 or DLT 8000.

Advanced troubleshooting

If you report a problem to Exabyte Technical Support, you may be asked to create a diagnostic listing. To create a diagnostic listing, you can use the library's serial port and a console interface program, or you can use the Ethernet port and an FTP utility. For more information about how to create diagnostic listings, see Chapter 11.

To report a problem to Exabyte Technical Support, see the inside back cover for contact information.

A Specifications

This appendix provides general specifications for the library, including:

- Overall specifications
- Storage capacity
- Power cord requirements
- SCSI cable specifications
- SCSI terminator requirements
- SCSI adapter requirements
- Ethernet cable specifications
- Fibre Channel cable specifications

Overall specifications for the library

General specifications	
Interface:	SCSI-2
Maximum sustained data transfer rate[a]:	DLT 7000: 10 MB/sec., compressed DLT 8000: 12 MB/sec., compressed
Size and weight	
Size (standalone model):	56.06 high x 19.0 wide [top] x 28.97 long (inches) (142.4 x 48.3 x 73.6 cm) 56.06 high x 27.0 wide [bottom] x 28.97 long (inches) (142.4 x 68.6 x 73.6 cm)
Size (rack-mount conversion):	52.47 high × 17.5 wide [back] × 28.97 long (inches) 52.47 high × 19.0 wide [front] × 28.97 long (inches) (133.3 × 44.5 [back] × 73.6 cm) (133.3 × 48.3 [front] × 73.6 cm)
Weight (standalone)[b]:	385.0 lb (174.6 kg)
Weight (rack-mount)[b]:	277.0 lb (125.6 kg)
Operating environment	
Ambient temperature:	+ 10°C to + 35°C (+ 50°F to + 95°F)
Relative humidity:	20% to 80%, noncondensing
Wet bulb:	26°C (79°F) max
Power	
Input voltages:	Accepts 100 to 240 VAC at 50 to 60 Hz; automatic AC input voltage selection
Power consumption:	25 watts minimum; 680 watts maximum
BTU output:	85 BTU/hour minimum; 2,322 BTU/hour maximum

[a] Assumes a 2:1 compression ratio.

[b] Two DLT 7000 or 8000 tape drives, 90 cartridge slots, and one power supply installed in the library.

Storage capacity

The table below summarizes the storage capacity of the library.

Library configuration[a]	Capacity	
	DLT 7000	DLT 8000
30 data cartridges	2.1 terabytes (TB)	2.4 TB
60 data cartridges	4.2 TB	4.8 TB
90 data cartridges	6.3 TB	7.2 TB

[a] Assumes that the tape drives are writing data at a 2:1 compression ratio.

Power cord requirements

The library is shipped with a seven-foot (2.1 meter), 18 AWG, 3-conductor AC power cord for 120 volt use in the United States and Canada. The power cord has a molded NEMA 5-15P male connector on one end and a molded IEC 320 female connector on the other end. The power cord is UL Listed and CSA Certified.

Other voltages and international use

If you are planning to use an input voltage other than 120 volts AC or if you plan to use the library outside of the United States or Canada, you must supply your own power cord.

Criteria for U.S. and Canadian 220 VAC power cord

- It must have a molded NEMA 6-15P attachment plug on one end.
- It must have a molded IEC 320 female connector on the other end.
- The cordage must be an SJT or SVT type, 3-conductor, 18 AWG minimum.
- The power cord must comply with local electrical code.

Criteria for international 230 VAC power cord

- It must have an attachment plug of the proper type, rating, and safety approval for the intended country.
- It must have an IEC 320 female connector on one end.
- The cordage must be adequately rated and harmonized to CENELEC publication HD-21.

SCSI cable specifications

Exabyte recommends wide SCSI cables that conform to SCSI-3 specifications, as described in the following table.

Characteristic	Differential specification
Cable impedance (in Ohms)[a]	Max 160 Nom 122 Min 115
Impedance difference between any two signals on the same cable[b]	20 Ohms
Conductor size[b]	# 30 AWG min
Cable skew delay[c]	2.5 nS
Propagation delay	5.4 nS/meter max
Pair-to-pair propagation delta delay	0.15 nS/meter max
Signal attenuation	0.095 db max/meter @ 5 MHz[d]

[a] Excluding TERMPWR conductors

[b] Recommended specification

[c] The maximum difference in propagation time allowed between any two SCSI bus signals measured between any two SCSI devices

[d] Measured differentially

Cable length for HVD configurations

The total length of all internal and external cables on the SCSI bus should not exceed 25 meters (82 feet).

Cable length for LVD configurations

The maximum allowable length of an LVD SCSI bus, including all internal and external cables, is specified as follows:

- If you have more than two devices on the LVD bus, the maximum allowable length is 12 meters (39 feet).
- If you are making a point-to-point connection (target and initiator only), the maximum length is 25 meters (82 feet).

Determining the cable length for each bus

1. For each bus, add the lengths of all external SCSI cables.
2. To that total, add the internal SCSI cable lengths used by the library and tape drives, as appropriate:
   - For each tape drive, add 35.5 centimeters (14 inches) to allow for the cable used by the tape drive inside the library.
   - For the library, add 55.9 centimeters (22 inches) for the internal cable used by the library itself.

SCSI terminator specifications

The SCSI terminator must match the wide SCSI bus configuration (LVD or HVD) of the 690D. In addition, all termination must be external. Do not use internal terminators to terminate the library or the tape drives.

To ensure proper performance of the library and tape drives, Exabyte recommends AMP Amplimite 869515-1 as a wide HVD SCSI terminator.

For LVD buses, Exabyte recommends using AMP Amplimite 796051-1 (SE/LVD Multi-mode) terminators.

SCSI adapter specifications

The wide-to-narrow SCSI adapter, used to connect the wide (68-pin) differential library to a narrow (50-pin) differential SCSI bus, must terminate the unused data lines in the library's wide SCSI configuration.

A 68-pin female to 50-pin male adapter, part number 320225, is available from Exabyte.

➤ **Important** If you use an adapter other than the one available from Exabyte, make sure it terminates the unused data lines.

Ethernet cable specifications

The Ethernet port connector is a pin-through-hole RJ-45 shielded connector. To connect to the Ethernet port, use an approved Category 3 (10Base-T connection) or Category 5 (100Base-T connection) data-grade cable compliant with EIA/TIA 568.

Fibre Channel cable specifications

To connect the FC12 router to a Fibre Channel network, use a cable that conforms to the specifications listed in the following table.

Type	Shortwave optical
Wavelength	850 nm (shortwave laser, non-OFC compliant)
Cabling	50- or 62.5-micrometer multimode fiber
Connector	SC duplex
Maximum length	500 meters
Adapter (if necessary)	Gigabit interface converter (GBIC) module

B SCSI Configuration

This appendix provides an overview of the *Small Computer System Interface 2* (*SCSI-2*) and gives an overview of how to configure the SCSI bus. *SCSI* is a standard specification that allows an application running on a host computer to communicate with peripheral SCSI devices, such as the library and the enclosed tape drives. The library uses SCSI commands to receive instructions from the host and to report its status to the host.

SCSI components

The SCSI system consists of the following components:

- **Initiator.** The host computer system acts as the initiator of commands. It consists of the application software, the operating system, the device driver, and the SCSI adapter card.

- **Bus.** The SCSI cables connected to the adapter card and to the library (as well as other devices on the bus) provide a pathway (or "bus") for passing commands.

- **Targets.** The library and the tape drives are peripheral devices (or targets) that are capable of receiving commands from the host. Up to 16 devices can be connected to a wide SCSI bus, in what is referred to as a *daisy chain*.

SCSI bus considerations

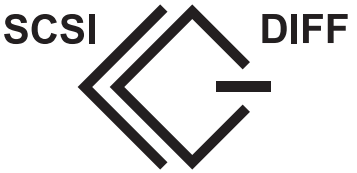
This section provides the basic rules and considerations for setting up the library on the SCSI bus.

Single-ended, LVD, or HVD

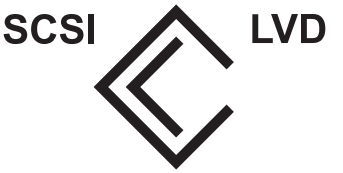
The Exabyte 690D supports LVD and HVD SCSI configuration only. Therefore, every SCSI device attached to the SCSI bus must be compatible: either *low-voltage differential* (LVD) or all *high-voltage differential* (HVD).

If your library is LVD, then all devices you install on the SCSI bus must also be LVD. If your library is HVD, all devices must be HVD. SCSI devices can include the tape drives installed in the library, the adapter card installed in your host computer, additional devices attached to the SCSI bus, and terminators.

The SCSI symbols that distinguish between HVD and LVD are shown in the following figure.



High-voltage differential (HVD)



Low-voltage differential (LVD)

Although LVD SCSI is compatible with single-ended SCSI, the internal SCSI cable lengths for the 690D library may cause the total cable length to exceed the maximum length for a single-ended bus. Exabyte therefore does not support single-ended devices on the LVD SCSI bus for this library.

CAUTION

Do not connect the LVD library to a single-ended bus. Doing so may cause the bus to hang.

Also, do not mix LVD and HVD devices on the same SCSI bus, or you may damage the devices attached to that bus.

Narrow or wide SCSI

The Exabyte 690D library supports wide SCSI only. The DLT 7000 and DLT 8000 tape drives also support wide SCSI only.

Fast SCSI

The library supports fast SCSI, which does not require any special cabling or configuration. However, proper cable lengths, stub length, and termination are more important on a fast SCSI bus than on a regular SCSI bus.

SCSI cabling

When connecting the library and other devices on the SCSI bus, follow these guidelines for SCSI cabling:

- ✔ **HVD/LVD cable lengths.** Make sure the total length of all internal and external cables on the SCSI bus does not exceed 12 meters (39 feet). If you have a point-to-point connection, make sure the total cable length does not exceed 25 meters (82 feet).

- ✔ **Internal cabling.** You must include the amount of internal cabling in your calculations. See "Determining the cable length for each bus" on page 244 for information.

  If you have any other external devices on the bus (not installed inside your host computer), these devices may have some amount of internal SCSI cabling as well.

Termination

If the library or any of the tape drives is the last device on the SCSI bus, you must attach a terminator to the appropriate SCSI connector at the back of the library.The SCSI terminator must match the SCSI bus configuration (wide, HVD or LVD).

SCSI IDs

Each device on the SCSI bus must have a unique ID. The host computer uses these IDs to identify each device. The SCSI ID also determines which device has priority when more than one device is trying to communicate with the host. The lower the ID, the lower the priority of the device.

Note: The SCSI ID does not depend on physical location. For example, the last device on a multi-device SCSI bus can have a SCSI ID of 2.

The library and tape drives each use one SCSI ID, totalling up to seven SCSI IDs. Separate IDs allow the library and tape drives to operate as independent devices, receiving different sets of SCSI commands from the host.

Notes

C Fibre Channel Configuration

This appendix provides instructions on how to connect the 690D to a Fibre Channel network using the Exabyte FC12 Fibre Channel to SCSI router.

This appendix describes how to:

- Connect the router to the library
- Verify the SCSI IDs
- Connect the router to the Fibre Channel network

➤ **Important** These instructions assume you have a working knowledge of Fibre Channel and SCSI operations and an ability to configure Fibre Channel equipment on a Storage Area Network (SAN). For more information about configuring and operating the router, see *Exabyte FC11 and FC12 Installation and Operation.*

If necessary, obtain the following additional equipment and tools:

- SCSI cables (two for the router and up to five for the library)
- Fibre Channel cable (see page 246)
- Fibre Channel cable adapter (see page 246)
- Additional SCSI terminators for the tape drives (see page 245)

Protect from ESD

Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use a grounded static protection wristband during installation. If a wristband is not available, touch a known grounded surface.

Power off the library

1. Turn the library's power switch to off.
2. Disconnect the power cord.

> **WARNING!**
>
> Before performing this installation or maintenance procedure, be sure that the library power switch is in the off position and that the power cord is disconnected from the library and the outlet.

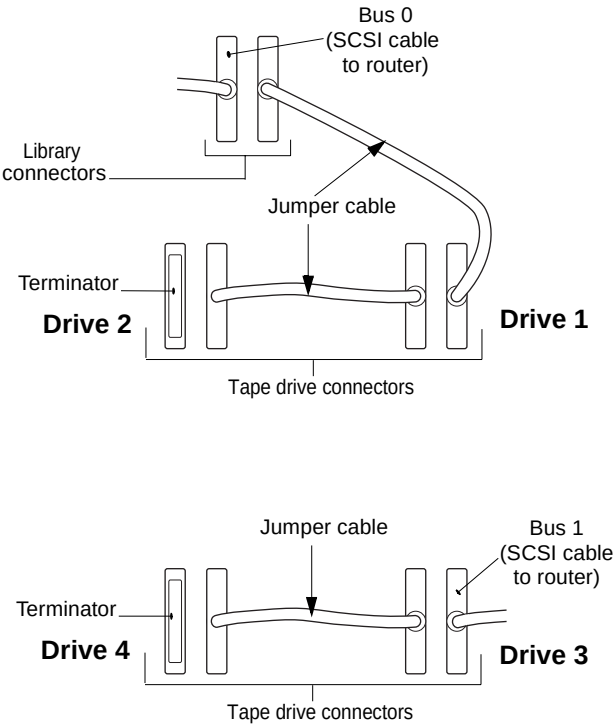
3. Disconnect all external cables from the back of the library.

Connecting the library to the router

You can connect two SCSI buses to the FC12 router. To maximize communications between the library and the router, you must divide the SCSI target devices (the library and tape drives) evenly on bus 0 and bus 1 on the back of the router.

➤ **Important** The maximum cable length for an HVD/LVD SCSI bus is 82 feet (25 meters). When you connect the SCSI buses to the router, make sure the cabling does not cause bus lengths to be exceeded. See page 244 for more information.

As an example, the steps in this section describe how to connect a library with four tape drives to the router, as shown in the figure below.



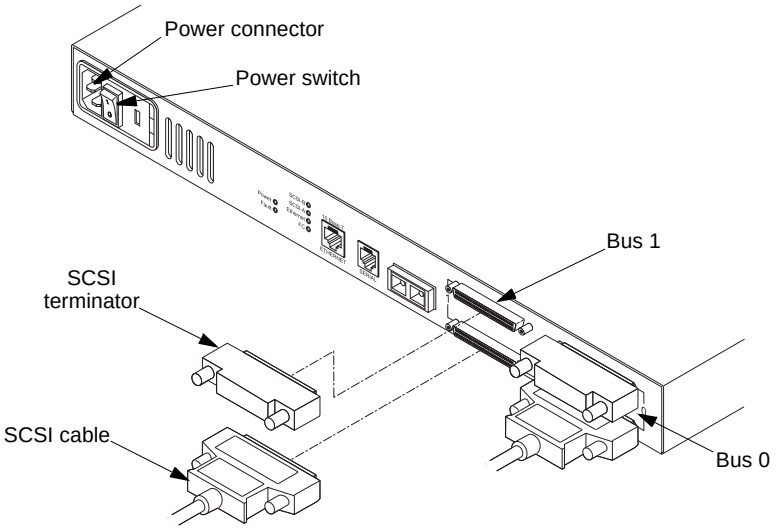
To connect the library to the router:

1. Divide the tape drives as evenly as possible according to their numbered positions, as shown in the figure above.

   Note: If you have an odd number of tape drives, you can attach the extra drive to either SCSI bus.

2. Using SCSI cables, connect the lower-numbered half of the drives (drives 1 and 2 in the example on the previous page) and the library to either connector of bus 0 on the back of the router, as shown in the figure below.

➤ **Important** When you attach the SCSI cables to the SCSI connectors, make sure you tighten the SCSI cable jack screws to no more than 2.0 inch-pounds (2.3 kg-cm) of torque.



(Standalone router shown for clarity)

➤ **Important** Always connect the SCSI bus with the lowest numbered drives and the library to bus 0 on the router.

If you install additional tape drives after completing this procedure, make sure the drives are divided evenly and the SCSI bus with the lowest numbered drives and the library are connected to bus 0 on the router.

3. Using SCSI cables, connect the higher-numbered half of the drives (drives 3 and 4 in the example on page 256) to either connector of bus 1 on the back of the router, as shown on page 257.

4. Connect a terminator to each of the remaining connectors on the tape drives (page 256) and the router (page 257).

5. Make sure the power switch on the back of the library is off (the 0 is pressed) and connect the library's power cord. (See Step 9 on page 41 for further details.)

6. Make sure the power switch on the back of the router is off (the 0 is pressed) and connect the router's power cord. (See the figure on page 257.)

7. Turn the library's power switch on. (See Step 10 on page 42 for further details.)

Verifying the SCSI IDs

Using the library's operator panel, make sure the library and tape drives occupy the SCSI IDs listed in the following table. If necessary, you can change the SCSI IDs by using the Configuration Menu on the operator panel. (For more information, see page 56.)

Device	SCSI ID
Library	0
Tape drive (TD) 1	1
TD 2	2
TD 3	3
TD 4	4
TD 5	5
TD 6	6

After connecting the library to the router and verifying the SCSI IDs, you can check the router's Fibre Channel-to-SCSI mapping to make sure the router recognizes each target device. For information and instructions, see *Exabyte FC11 and FC12 Installation and Operation*.

Connecting the router to the network

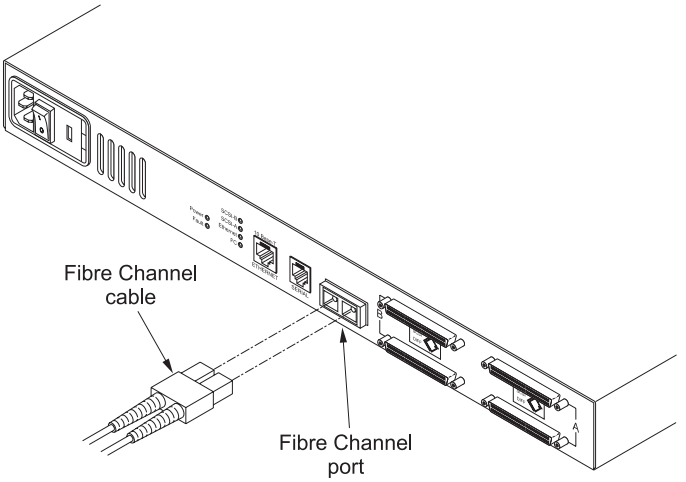
The Fibre Channel port on the back of the router accepts a 50- or 62.5-micrometer multimode shortwave optical cable. You may need to use a cable adapter or different Gigabit Interface converter (GBIC) if your cabling doesn't match the type supported by the router's connectors. For cable specifications, see page 246.

➤ **Important** If you are attaching the router to a Fibre Channel arbitrated loop, make sure that all Fibre Channel host bus adapters (HBAs) on the loop have been configured to scan for other loop devices from the lowest arbitrated loop physical address (ALPA) to the highest ALPA. (This is the default scanning mode for most HBAs. If you are unsure, check the HBA documentation.)

To connect the router to the Fibre Channel network:

1. Make sure the router's power switch is off.
2. Remove the protective cover from the router's Fibre Channel connectors.

3. Connect the appropriate cable from the Fibre Channel network into the Fibre Channel port on the back of the router.



4. Turn the router's power switch on, and wait for the router to complete its power-on self-test (POST).

5. If necessary, reboot your host computer(s) on the Fibre Channel network to allow the operating system to detect the library and tape drives.

➤ **Important** You must allow the router to complete its POST before rebooting your host computers.

---

6. If you are having any trouble with library operation, refer to "If problems occur..." on page 43. Otherwise, see Chapter 3 for instructions on configuring the library.

Notes

D Error Codes

This appendix describes the error codes that appear on the library's LCD (liquid crystal display). LCD error codes do not reflect tape drive errors. For information about tape drive errors, see page 97.

CAUTION

Library components can be replaced only by Exabyte-approved service providers. If you cannot find an obstruction or other obvious cause for the problem, contact your service provider. Unless you have a self-maintenance contract, do not attempt to replace any components. If you do, you will void your warranty.

Two types of error codes can appear on the LCD: numbered and unnumbered error codes. Numbered error codes must be corrected before library operation can continue. Unnumbered error codes notify you of a hardware error but do not interrupt library operation.

For information about SCSI error conditions (sense data), refer to pages 186 through 188 and to the *Exabyte 690D Library SCSI Reference*.

CAUTION

Some corrective actions advise you to reset the library. Before resetting, make sure there is no SCSI activity on any connected SCSI bus, so you do not disrupt communications.

The following table describes the unnumbered library hardware error conditions.

Error description	Corrective action
Auxiliary Fan Fail. The library's auxiliary fan has failed.	▪ Power off the library. ▪ Contact your service provider. **CAUTION:** Power off the library as quickly as possible. Continued operation with this fan failure could cause permanent damage to the library's controller card.
Top Power Supply Fail. The power supply located above the AC power entry module has failed.	▪ Replace the failed power supply (see page 119). ▪ If you need help replacing the power supply, contact your service provider.
Bottom Power Supply Fail. The power supply located below the AC power entry module has failed.	
Distribution Fan Fail. The fan that cools both the primary and the redundant power supply has failed.	▪ Power off the library. ▪ Contact your service provider. **CAUTION:** Power off the library as quickly as possible. Continued operation with this fan failure could cause permanent damage to the library's power supply.
Drive *n* Fan Fail. Tape Drive *n*'s fan has failed (where *n* represents the tape drive number).	▪ Use your application software to remove the tape drive with the failed fan from library operation. ▪ Contact your service provider.

The following table lists the numbered library hardware error conditions in numerical order.

Error number	Description	Corrective action
10	**Dropped a cartridge.** The robot dropped a cartridge.	▪ Manually return the cartridge to its original slot. **CAUTION**: Do not try to put the cartridge back in the robot gripper. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
11	**Source empty.** There is no cartridge in the source location.	Install a cartridge in the source location or redirect the robot to another location.
12	**Destination full.** A cartridge already exists in the destination location.	Remove the cartridge from the destination or redirect the robot to another location.
13	**Put failure.** The robot could not successfully place a cartridge because of mechanical problems.	▪ Make sure there is nothing blocking the robot. ▪ If the error persists, contact your service provider.
14	**Pick failure.** The robot could not successfully pick a cartridge because of mechanical problems.	
15	**No source element; No dest element.** No data cartridge magazine is installed in the selected location.	Install a data cartridge magazine or redirect the robot to another location.
16		

Error number	Description	Corrective action
17	**Robot full at move.** There was a cartridge in the gripper before a move operation or when the operator powered-on or reset the library.	▪ Manually remove the cartridge from the robot gripper and return it to its original slot. **CAUTION**: Do not try to put the cartridge back in the robot gripper. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
18	**Source inside drive.** The robot could not successfully pick a cartridge because it was still loaded in the tape drive.	Use the Open Tape Drive command on the operator panel to unload the tape drive. Or, redirect the robot to another source location.
19	**Pick error.** The robot could not successfully pick from a full cartridge slot.	▪ Open the door and look for anything that might be obstructing the gripper. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
21	**Grip home error.** A gripper error occurred.	
30	**R axis does not move.** The robot could not move along the reach axis.	▪ Open the door and look for anything that might be obstructing the robot on its reach axis. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
31	**R axis failed home.** The robot could not determine the home position on its reach axis.	

Error number	Description	Corrective action
36	**R LM629 reset fail.** The library could not reset the servo chip for the reach axis.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
38	**Cannot load drive.** The robot cannot push the cartridge far enough to load the cartridge into the tape drive.	▪ Open the door and look for anything that might be obstructing the robot along its reach axis. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
40	**V axis does not move.** The robot could not move along the vertical axis.	▪ Open the door and look for anything that might be obstructing the robot along its vertical axis. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
41	**V axis failed home.** The robot could not determine the home position on the vertical axis.	
42	**V move into EE port.** The robot could not move in front of the entry/exit port because the entry/exit port was extended.	▪ Retract the entry/exit port (see page 89) and repeat the move command. ▪ If the error persists, contact your service provider.

Error number	Description	Corrective action
46	**V LM629 reset fail.** The library could not reset the servo chip for the vertical axis.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
50	**D axis does not move.** The drum could not move on its axis.	▪ Open the door and look for anything that might be obstructing the drum. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
51	**D axis failed home.** The library could not determine the home position for the drum.	
52	**Mult. drum indices.** The library found multiple drum flags and could not determine the drum home position.	▪ Contact your service provider.
53	**R axis interference.** The library could not position the drum because the reach axis was extended too far.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
56	**D LM629 reset fail.** The library could not reset the servo chip for the drum axis.	▪ Make sure the library and tape drives are not being used by any host, then reset the library using the operator panel. ▪ If the error persists, contact your service provider.

Error number	Description	Corrective action
60	**No label.** The bar code scanner could not read the bar code label because there was no label on the cartridge.	This error appears on the Label Information screen. ▪ If the cartridge does not have a label, place a label on the cartridge (see page 31). ▪ If the error persists, contact your service provider.
61	**Label read error.** The bar code scanner could not read the bar code label because the label was unreadable.	This error appears on the Label Information screen. ▪ If the cartridge has a label, reposition or replace it. ▪ If the label does not contain a checksum character, make sure the Verify Checksums option is OFF (see page 80). ▪ If the error persists, contact your service provider.
62	**Not present.** The bar code scanner could not read the bar code label because there was no data cartridge magazine present.	This error appears on the Label Information screen. ▪ If necessary, install a data cartridge magazine.
63	**No scan; no inv info.** Inventory could not be verified on a single slot scan because the occupied status was unknown.	▪ Make sure the library and tape drives are not being used by any host, then reset the library using the operator panel. ▪ If the error persists, contact your service provider.

Error number	Description	Corrective action
64	**Bad label checksum.** The bar code scanner could not read the label because of a problem with the checksum character.	▪ If the label does not contain a checksum character, make sure the Verify Checksum option is OFF (see page 80). ▪ Check the label for damage and replace the label, if necessary (see page 31). ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
65	**EE port extended.** The robot could not scan labels on data cartridges in the entry/exit port because the entry/exit port was extended.	▪ Retract the entry/exit port (see page 89) and repeat the scan command. ▪ If the error persists, contact your service provider.
67	**Did not read BC data.** The bar code scanner could not read the bar code label in the fixed cartridge slot because of a firmware or hardware problem.	This error appears on the Label Information screen. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware.

Error number	Description	Corrective action
70	**Robot FRU data bad.** The library was unable to retrieve robot calibration data from the robot field replaceable unit (FRU).	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
71	**Parameter > limit.** Firmware error.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware.
72	**Front door open.** The front door was opened before the library completed its commands.	▪ Close and lock the front door. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel.
74	**Cart. inaccessible.** The robot is unable to pick the cartridge from the tape drive.	The cartridge may still be loaded in the tape drive. ▪ Use the Open Tape Drive command (see page 99) to unload the tape drive. ▪ Use the Move Cartridge command (see page 173) to move the cartridge. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel.

Error number	Description	Corrective action
75	**Internal SW error.** Firmware error.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware.
76	**Pos error timeout.** The robot could not reach its destination along the vertical axis.	▪ Open the door and look for anything that might be obstructing the robot along its vertical axis. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
77	**Interface disabled.** The library was not in the correct control mode when the operator sent a command.	▪ Make sure you have set the correct control mode (see page 84). ▪ If the control mode is correct, contact your service provider.
78	**Drive not talking**. The library was unable to communicate with the drive.	▪ If you just replaced a tape drive, make sure the drive carrier is seated properly (see page 129). ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.

Error number	Description	Corrective action
79	**R axis not retracted.** The robot did not move to home before the current servo command was attempted.	▪ Open the door and look for anything that might be obstructing the robot along its reach axis. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
80	**EE port failed to extend.** The entry/exit port could not extend.	▪ Open the door and look for anything that might be obstructing the movement of the entry/exit port. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
81	**EE port failed to return.** The entry/exit port could not retract.	
86	**EE cartridge jammed.** The robot could not pick a cartridge from the entry/exit port magazine because it was stuck in a data cartridge slot.	▪ Make sure the data cartridge is inserted correctly in the entry/exit port magazine slot (see page 88). ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.

Error number	Description	Corrective action
87	**EE port door open.** The entry/exit port could not retract because the entry/exit port door was open.	▪ Make sure the entry/exit port door is closed. ▪ Repeat the Retract command (see page 89). ▪ If the error persists, contact your service provider.
90	**Drive HW error.** The tape drive could not perform an operation because of a hardware error.	▪ Use the Reset Tape Drive option on the operator panel to reset the tape drive. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware.
91	**Operation aborted.** A diagnostic or SCSI command was aborted by the operator.	▪ No corrective action required.
92	**Drive offline.** The tape drive cannot be used because it has been taken offline.	▪ Repeat the command, using another tape drive.
94	**Cal: drive occupied.** The tape drive could not be calibrated because a cartridge was loaded in the drive.	▪ Use the Open Tape Drive command (see page 99) to unload the cartridge and open the tape drive. ▪ Use the Move Cartridge command (see page 173) to move the cartridge. ▪ Reissue the calibration command.

Error number	Description	Corrective action
95	**Drive removed.** A drive was removed without using the Tape Drive Service Menu while the library was powered on.	▪ Power off the library. ▪ Locate the open drive slot and install a replacement tape drive or a service access cover. ▪ Power on the library. ▪ If the error persists, contact your service provider.
96	**Drive added.** A drive was installed without using the Tape Drive Service Menu while the library was powered on.	▪ Cycle power in the library (turn the library off and then on). ▪ If the error persists, contact your service provider.
97	**Can't close drive.** The robot could not close the tape drive handle because the cartridge would not stay seated in the tape drive.	▪ Contact your service provider.
100	**Move interrupted.** The movement of the robot was interrupted.	▪ Move the robot toward the front of the library. If there is a cartridge in the gripper, remove the cartridge, and return it to its original slot. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel.
101	**Drive only command.** The attempted command could not be executed because the specified element was not a drive.	▪ Select a drive and reissue the command.

Error number	Description	Corrective action
102	**Drive not ready.** The robot could not open the tape drive door because the tape drive has not issued a ready status.	▪ Retry the current command. ▪ If the tape drive still does not issue a ready status, make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
103	**Can't close handle.** The robot could not close the tape drive door.	▪ Open the library door and look for anything that might be obstructing the robot along its reach axis. ▪ Make sure the tape drive handle is not damaged. Do not try to manually open or close the tape drive handle. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
104	**Drive did not eject.** The library was unable to pick a cartridge because the cartridge did not eject from the tape drive.	▪ Use the Open Tape Drive command (see page 99) to unload the cartridge and open the tape drive. ▪ Use the Move Cartridge command (see page 173) to move the cartridge. ▪ If the error persists, contact your service provider.

Error number	Description	Corrective action
105	**Can't open drive.** The robot could not open the tape drive handle.	▪ Open the library door and look for anything that might be obstructing the robot along its reach axis. ▪ Make sure the tape drive handle is not damaged. Do not try to manually open or close the tape drive handle. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
106	**Tape leader caught.** During an attempt to move a cartridge from the tape drive, the drive leader did not disconnect from the tape.	▪ Contact your service provider.
107	**Bad cal value.** Calibration came up with a bad value.	▪ Perform calibration again. ▪ If the error occurs again, make sure the library and the tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
108	**Missing cal target.** The robot could not find a calibration target.	▪ Open the library door and look for anything that might be blocking the calibration targets. ▪ Repeat library calibration. ▪ If the error persists, contact your service provider.

Error number	Description	Corrective action
109	**Check cleaner.** A clean drive operation failed because the drive did not unload the cleaning cartridge within a reasonable amount of time.	▪ Use the Open Tape Drive command to unload the cartridge and open the tape drive. Remove the cartridge (see page 99). ▪ Make sure the cartridge in the tape drive is a cleaning cartridge. ▪ If the cartridge is a cleaning cartridge, make sure it still has cleaning cycles available (see page 73).
130	**SCSI chip error; SCSI unexpected int; SCSI int stuck error.** There was a SCSI chip failure.	▪ Make sure all devices (including terminators) are either single-ended or differential. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
131		
132		
133		
134		
135		
136		
137		

Error number	Description	Corrective action
192	**Drive comm error.** The library could not communicate with a tape drive.	▪ If you just replaced a tape drive, make sure the drive carrier is seated properly. ▪ Check the tape drive SCSI ID and change the SCSI ID as necessary. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
194	**All slots are full.** The robot could not find an empty cartridge slot in Demo Mode.	Open the library door and remove at least one data cartridge from a data cartridge magazine.
195	**All slots are empty.** The robot could not find a cartridge to pick in Demo Mode.	Open the library door and insert at least one data cartridge in a data cartridge magazine.
196	**Laser not calibrated.** The laser is not properly set up to read bar code labels.	Contact your service provider.

Error number	Description	Corrective action
200	**H axis does not move.** The robot could not move on its horizontal axis.	▪ Open the door and look for anything that might be obstructing the robot along its horizontal axis. ▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.
201	**H axis failed home.** The robot could not determine the home position along the horizontal axis.	
206	**H LM629 reset fail.** The library could not reset the servo chip for the horizontal axis.	▪ Make sure the library and tape drives are not being used by any host, then reset the library from the operator panel. ▪ If the error persists, contact your service provider.

Notes

E Laser Safety Information

This appendix describes the laser bar code scanner and safety notices for the scanner.

The Exabyte 690D library uses a laser beam to read the bar code labels. Laser power of up to 1 milliwatt at 660 nanometers could be accessible inside the library. This laser energy complies with CDRH Class II and IEC Class 3B.

Laser safety interlocks

The library has two safety interlock features to prevent laser beam exposure: the keylock and the tape drive interlock.

Keylock

When you turn the key to unlock the door, the solenoid latch will not release the door until the robot has finished performing the current command, moved to park position, and the laser on the bar code scanner is powered off.

Tape drive interlock

When a tape drive is removed, the software controlling the robot and laser bar code scanner receives a status signal from a sensor at the drive interface. This signal tells the software that a drive is no longer present. The software then prevents the robot from moving to the area in front of the empty drive slot.

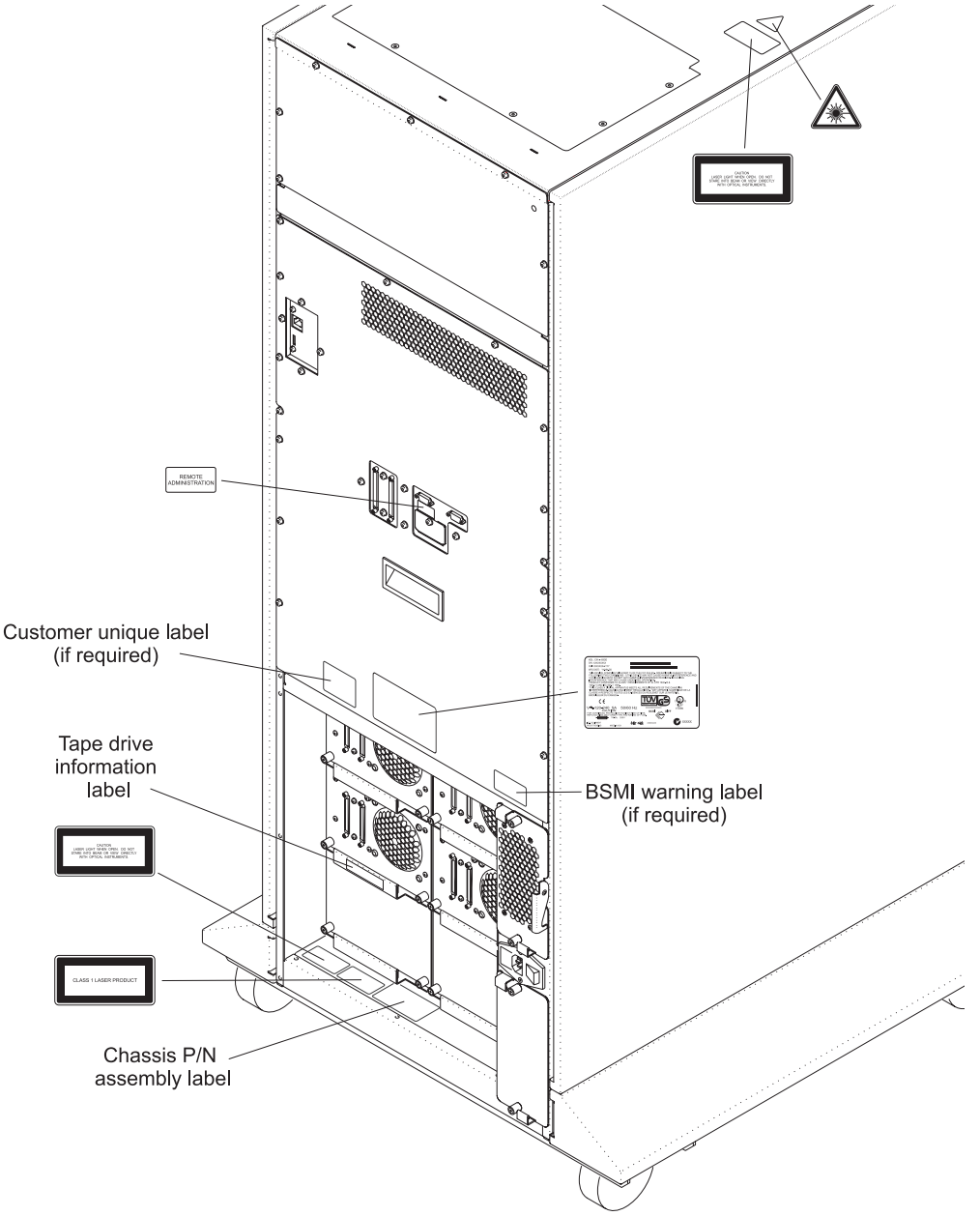
FDA CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser light exposure.

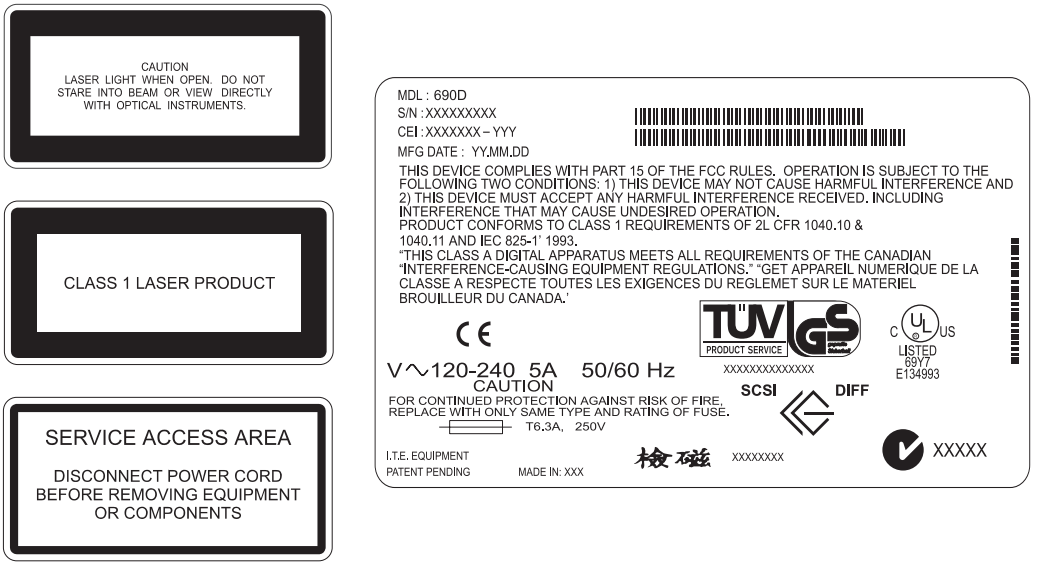
Laser safety labels

The library contains laser safety notice labels that are located on the service access cover and the back of the library. The figure on the following page shows the locations of these labels.

Note: If your library contains less than six tape drives, laser safety labels are also placed on the service access covers.


REMOTE ADMINISTRATION
Customer unique label (if required)
Tape drive information label
BSMI warning label (if required)
CLASS 1 LASER PRODUCT
Chassis P/N assembly label

The following figure shows a replica of each laser safety label on the library (HVD library labels shown).


CAUTION
LASER LIGHT WHEN OPEN. DO NOT STARE INTO BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS.
CLASS 1 LASER PRODUCT
SERVICE ACCESS AREA
DISCONNECT POWER CORD BEFORE REMOVING EQUIPMENT OR COMPONENTS
MDL : 690D
S/N : XXXXXXXXX
CEI : XXXXXXX – YYY
MFG DATE : YY.MM.DD
THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: 1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE AND 2) THIS DEVICE MUST ACCEPT ANY HARMFUL INTERFERENCE RECEIVED. INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.
PRODUCT CONFORMS TO CLASS 1 REQUIREMENTS OF 2L CFR 1040.10 & 1040.11 AND IEC 825-1' 1993.
"THIS CLASS A DIGITAL APPARATUS MEETS ALL REQUIREMENTS OF THE CANADIAN "INTERFERENCE-CAUSING EQUIPMENT REGULATIONS." "GET APPAREIL NUMERIQUE DE LA CLASSE A RESPECTE TOUTES LES EXIGENCES DU REGLEMET SUR LE MATERIEL BROUILLEUR DU CANADA.'
TÜV GS
PRODUCT SERVICE
XXXXXXXXXXXXXX
C UL US
LISTED
69Y7
E134993
V~120-240 5A 50/60 Hz
CAUTION
FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE WITH ONLY SAME TYPE AND RATING OF FUSE.
T6.3A, 250V
SCSI DIFF
I.T.E. EQUIPMENT
PATENT PENDING
MADE IN: XXX
XXXXXXXX
XXXXX

Note: If you have DLT™LVD drives installed in your library, the following LVD SCSI symbol will replace the HVD SCSI symbol located on the large label above.

Low-voltage differential (LVD)

F Shipping the Library

This chapter describes procedures for returning the library for service.

Returning the library for service

If you need to return the library to the factory for service, contact your service provider for shipping instructions.

If your service provider instructs you to return the library to Exabyte, contact Exabyte Direct Sales to obtain a Return Materials Authorization (RMA) number and the shipping address (see the inside back cover). When you have the RMA number, follow the instructions to prepare the library for shipping.

Preparing the library for shipping

To prepare the library for shipping:

1. From inside the library, remove all magazines. You can manually rotate the drum assembly to reach the back magazines.

2. Make sure the robot and the tape drives do not contain cartridges.

3. Power off the library.

4. Remove the power cord, the SCSI cables, and any terminators or jumpers. Do not ship these items if you are returning the library to the factory.

5. If you have not already done so, contact your service provider for shipping instructions.

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Notes

Contacting Exabyte

To obtain technical support:	
Exabyte Technical Support	1-800-445-7736
	1-303-417-7792
	1-303-417-7160 (fax)
e-mail	support@exabyte.com
World Wide Web	http://www.exabyte.com
To order supplies and accessories:	
Exabyte Express	1-800-EXATAPE (1-800-392-8273)
	1-972-481-4221
	1-972-406-9081 (fax)
To return equipment for service:	
Exabyte Service	1-800-EXATAPE (1-800-392-8273)
	1-303-417-7199 (fax)
	Scotland: + 44-1-324-564564
e-mail	service@exabyte.com

Note: If it is more convenient to your location, contact Exabyte Technical Support in Europe at the following numbers:

Phone: + 31-30-254-8890
Fax: + 31-30-258-1582